

Techn.

1339

i/5

REPORTS

ON THE

UNIVERSAL EXHIBITION,

1867.

VOL. V.

CONTAINING REPORTS ON

PRODUCTS AND APPARATUS OF
FORESTRY, SHOOTING, FISH-
ING, AND AGRICULTURE.

CHEMICAL PROCESSES AND
PRODUCTS.

SEWING MACHINES.

CARRIAGES AND HARNESS.

HORSES AND HORSE-SHOEING.

CATTLE.

USEFUL INSECTS.

HORTICULTURE.

Presented to both Houses of Parliament by Command of Her Majesty.



LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,

PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.

FOR HER MAJESTY'S STATIONERY OFFICE.

1868.

[Price 1s. 8d.]



Techn.

1339

i/5

REPORTS

ON THE

UNIVERSAL EXHIBITION,

1867.

VOL. V.

CONTAINING REPORTS ON

PRODUCTS AND APPARATUS OF
FORESTRY, SHOOTING, FISH-
ING, AND AGRICULTURE.

CHEMICAL PROCESSES AND
PRODUCTS.

SEWING MACHINES.

CARRIAGES AND HARNESS.

HORSES AND HORSE-SHOEING.

CATTLE.

USEFUL INSECTS.

HORTICULTURE.

Presented to both Houses of Parliament by Command of Her Majesty.



LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,

PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.

FOR HER MAJESTY'S STATIONERY OFFICE.

1868.

[Price 1s. 8d.]

Leolu.

1339 i (5)



PART II. OF THE REPORTS OF THE

VOL. II.

CONTAINING REPORTS ON

THE PROGRESS OF THE AGRICULTURE AND THE
MANUFACTURES OF THE KINGDOM, AND THE
STATE OF THE TRADES, AND THE
FINANCIAL CONDITION OF THE NATION.

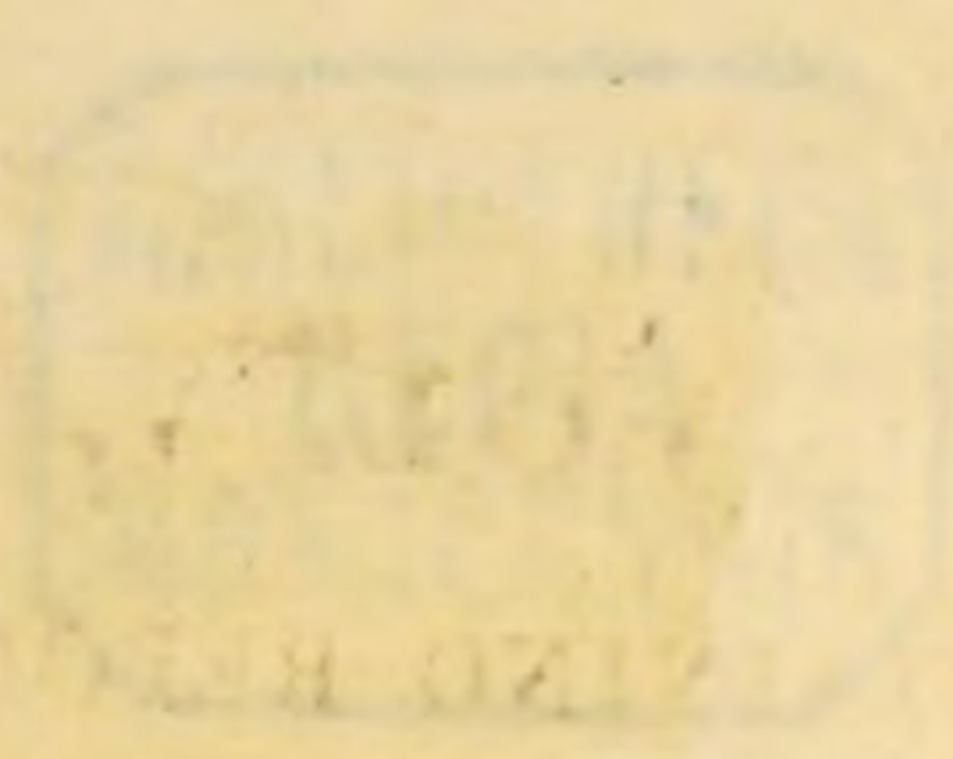
The Reports on the *Foreign Expenditure* will be printed by
the Stationer.

Volume I. will contain the *General Report*, with the
of *Statistics*, the *Value of the Produce*, the *Value of the
the Reports on the various Trades*, and *the Returns* relative to the *Army* and *Naval* Expenditure.



LONDON:
PRINTED BY GEORGE & SONS, 15, N. MARK LANE, ST. MARKS CHURCH, LONDON.
FOR THE SALE OF THE PUBLISHED PAPERS.

REPORT ON THE PROGRESS OF THE FARMING AND FISHING INDUSTRIES OF THE UNITED STATES IN 1881



LIBRARY OF CONGRESS
DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C.
1882

The Reports on the Farming Industries will be printed in
Six Volumes.
Volume I will contain the General Report, with Tables
of Statistics, &c.; Volumes II, III, IV, V, will contain
the Reports on the various Classes; and Volume VI
the Reports relative to the New Order of Farming.



PRINTED BY THE GOVERNMENT PRINTING OFFICE
WASHINGTON: 1882



REPORTS

ON THE

PARIS UNIVERSAL EXHIBITION, 1867.

VOL. V.

CONTAINING REPORTS ON

PRODUCTS AND APPARATUS OF
FORESTRY, SHOOTING, FISH-
ING, AND AGRICULTURE.
CHEMICAL PROCESSES AND PRO-
DUCTS.
SEWING MACHINES.

CARRIAGES AND HARNESS.
HORSES AND HORSE SHOEING.
CATTLE.
USEFUL INSECTS.
HORTICULTURE.

Presented to both Houses of Parliament by Command of Her Majesty.



5-7

LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1868.

20400.

g.m.220

REPORTS

CONTENTS.

Class	Page
41. Products of Forest Cultivation, by P. L. Simmonds, Esq. .	1
„ Timbers and Forest Produce, &c., by T. W. Webber, Esq. .	33
42. Products of Shooting, Fishing, and of the Earth without Culture, by Professor W. Thomson	69
45. Spun and Woven Fabrics shown as Specimens of Dyeing, Bleach- ing, and Printing, by Professor Bolley	77
49. Apparatus used in Shooting, Fishing Tackle, and Implements used in gathering Fruits obtained without Culture, by Major J. B. Edwards, R.E., and Wentworth L. Cole, Esq.	93
50. Apparatus and Processes used in Agricultural Works, and in Works for the Preparation of Food, by Professor Archer	109
51. Chemical Processes, by Dr. Lyon Playfair, C.B., F.R.S.	123
57. Apparatus and Processes for Sewing and for Making-up Clothing, by Captain Hichens, R.E.	131
61. Carriages and Wheelwrights' Work, by G. N. Hooper, Esq.	143
62. Harness and Saddlery, by Henry Göschen, Esq.	187
71. Vegetables and Fruit, by Dr. Hogg	193
73. Fermented Drinks, by E. L. Beckwith, Esq.	199
75 to 80. Horses, Cattle, Dogs, &c., and on a New Mode of Shoeing Horses, by Captain Cockerell	241
81. Useful Insects, by A. Murray, Esq.	263
85. Vegetables, by Dr. Hogg	283
86. Fruit Trees, by Rev. T. C. Bréhaut	285
87. Seeds and Saplings of Forest Trees, by Dr. Hooker	303

LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOOD,
STATIONERS TO HER MAJESTY'S STATIONERY OFFICE.

Bayerische
Staatsbibliothek
München

INTRODUCTION.

THE following Reports on the various Classes in the Paris Exhibition, 1867, were prepared for the Science and Art Department in accordance with the directions of the Lords of the Committee of Council on Education, and must not be confounded with the International Jury Reports to be issued by the French Government, which are quite distinct.

The scope and object of these Reports will be gathered from the following extracts from the letter to the gentlemen who were requested to prepare them, and who in many cases were not connected with the International Jury:—

“The Lord President of the Council, following the precedent of the Paris Exhibition of 1855, is desirous of obtaining a series of Reports on the objects exhibited in the Paris Exhibition of this year. . . .”

“The special object of this Report is to direct the attention of British visitors, manufacturers, and others, to the useful novelties exhibited by various nations on the present occasion, to which it appears desirable their attention should be called. It is not intended to be an exhaustive Report upon the class, which it is presumed will be made by the International Juries for the Imperial Commission. The British Report should have special reference to the objects exhibited by the British Colonies and by Foreign countries, rather than those exhibited by the United Kingdom, although the latter should not be overlooked.”

“It is desirable that the Report should be as short as may be consistent with the nature of the subject, and it is absolutely necessary that it should be published during the Exhibition. It will therefore be indispensable that if the Report be undertaken by you, the manuscript should be delivered before the 15th of June at latest, and as much earlier as may be possible, to Captain Donnelly, R.E., the Secretary to the British Juries, who will afford all necessary information in Paris, and will act as Editor to the Reports.”

“It is probable that the Exhibition will be sufficiently arranged to enable an examination of the Class to be commenced about the 15th April.”

With the view of rendering these Reports useful to the public while the Exhibition lasted it was determined to publish them in a newspaper as quickly as possible. Arrangements having been made with the manager of the *Illustrated London News*, who undertook to produce them free of all cost to the Science and Art Department with a certain amount of illustration, the publication commenced on the 6th July 1867, and continued till the 7th December. By that time about two-thirds of the Reports had been published. These have been revised by the authors, and with the unpublished ones are complete in these volumes.

In arranging the Reports the order of the French classification has not been implicitly followed. The amount of matter rendering the division into four volumes desirable, those reports were brought together in each volume which appeared most allied to one another, an arrangement dictated as much by what seemed likely to be to the convenience of purchasers of single volumes as by any idea of a scientific classification.

REPORTS.

REPORT on the PRODUCTS of FOREST CULTIVATION.—
(Class 41.)—By P. L. SIMMONDS, Esq.

MR.
SIMMONDS
ON
FORESTRY.

THE products embraced in this Class take in a wide range, and include not only the specimens of various trees and the applications of their wood for cabinet and carpenters' work, shipbuilding, and turning, staves for casks, and shingles for roofing, the barks for textile purposes, for tanning and dyeing, cork, &c.; but also the uses of the leaves, gums, and resins, &c., and the charcoal and dried wood for fuel, ashes, basketwork, platting, &c. The principal riches of many countries depend in fact upon their forest products—products the great importance of which cannot be questioned.

“*En effet (dit Schacht) de quelque côté que nous dirigeons nos regards, ils tombent sur les produits forestiers ; nos habitations, nos vaisseaux, et nos chemins de fer, voire même nos mines, ne pourraient être, s'il n'existait pas de forêt. Sans combustibles, nous serions accablés par les froids de l'hiver ; la plupart des aliments, demandant à être préparés sur le feu, ne nous seraient d'aucune utilité ; la force de la vapeur nous serait inconnue, et elle ne nous transporterait pas à travers les continents et les mers, si la forêt ne nous donnait ou ne nous avait donné tout cela.*”

It will, of course, be impossible to do more than give a mere outline sketch of the most important exhibits. Compared with former Exhibitions, the collection of woods shown is very large and important, although from the size of the building, and the greater number of foreign countries exhibiting, several of the collections ^{Woods.} are exposed in out-of-the-way corners and places, either in the building or the park, where they were not easily to be found. Some of the larger wood-producing countries, such as the United States, New Brunswick, Tasmania, New Zealand, Vancouver Island, &c., either did not exhibit at all or sent but little. This deficiency, however, is more than compensated by the large collections sent on this occasion from the Central and South American States, by many European countries, and several of our own colonies.

In commencing our examination we will begin with the country which has originated this great International Exhibition, certainly one of the finest that has yet been held.

MR.
SIMMONDS
ON
FORESTRY.
—
France.

FRANCE makes a creditable display of its forest products in the raw material gallery, close to the grand entrance which divides the French portion from England. A very interesting sketch of the woodlands and forest products of France, accompanied by full details and statistics by M. E. de Gayffier, was given in the first edition of the French General Catalogue as the introduction to this Class. It is too long to quote entire, but it may be briefly condensed, as the statistical and descriptive notices heading the classes were withdrawn in the second edition in order to reduce the size of the volume.

There are nearly 27,000,000 acres of woodland in France, the principal forests being in the north, east, and centre of the empire, in each of which districts there about 160,000 acres. The south and west are not so well timbered. The annual production is about 20,000,000 cubic metres of wood, of which 18,000,000 are used for firewood; but the home supply is quite insufficient for the demand, and large supplies have to be drawn from Norway, Russia, Germany, and Italy. The value of the imports of wood have risen from 70,000,000 francs in 1855 to 154,000,000 francs in 1865.

The greater part of the collection shown in the French Court has been made by the Administration des Forêts of France and the Ecole Impériale Forestière.

There are some very neat relief models, under glass cases, of the forest elevations of the Alps, and the principal modes employed in bringing down wood from these elevations by slides, by rail, &c. There are also fine specimens of all the indigenous and introduced woods, especially circular sections of *Abies pectinata*, *Pinus Laricio*, *Quercus pedunculata* (of 170 years' growth) and other trees round the lower part of the court. These show the admirable suitability of the soil and climate for the production of large trees, and, by comparison from different localities, the variation resulting from situation and composition of the soil.

On shelves all round the court are ranged sections of woods, with the bark attached, well named and numbered. Below these, again, are photographs of the fruit and foliage from the published work of M. De Gayffier, illustrating the collection of the forest products of France.

In a glass counter-case are small polished slabs of different woods, and in other vitrines collections of different pine cones, acorns, and other seeds of forest-trees.

The woods are ranged under two classes—"Bois Feuillées" and "Bois Résineux."

In the centre of the collection will be found a chart of the forests of France, showing, in a salient manner, the dense woods and their relative position over the surface of the empire as compared with the geological character of the soil.

In one corner will be found a most instructive series of illustrations of the turpentine and resin collected from the maritime pine (*Pinus Pinaster*), which forms the principal riches of the country comprised between Bordeaux and Bayonne. An immense stimulus was given to this industry by the civil war in the United States, which cut off the supplies formerly obtained from the Southern States. In 1855 the export of indigenous resin from France was only valued at 2,250,000 f., but in 1865 it had risen to 27,250,000 f.

MR.
SIMMONDS
ON
FORESTRY.
—
Turpentine
and resin
collection.

First, there is a tree with a longitudinal incision, showing the old primitive mode of gathering the resin, permitting it to exude and collect in a hole in the ground, by which an impure resin was obtained and much of the volatile strength lost by evaporation.

Secondly, the improved system of Hugues is shown, small earthen pots being attached to an incision in the trunk, by which a larger and purer quantity of resin is obtained, the essential oil of turpentine being preserved. The ascending ladder, with small side-notches or steps, used by the workmen, is shown, and the tools for incising the bark. The products exhibited are the natural soft resin, which, by fusion or distillation, furnishes turpentine; galipot or white resin, less solid, which appears in the form of stalactites along the trunk of the tree, this has lost its volatile oil by spontaneous evaporation, when purified it is called "Burgundy pitch;" "brai noir," a dark residue; "gemme," the virgin resin; "crottas," a mixture of soft resin and galipot; "barras," which is like galipot, but entirely dry, and adheres to the trunk of the tree; yellow, amber and opaque resin, spirits of turpentine, and tar, or the deposit after distillation.

According to the nature of the soil, the trees are tapped at the age of from twenty to forty years. A pine of sixty or seventy years old will yield from six to eight kilogrammes of raw material, of which about one-third is pure resin and "barras."

On the counter is a good collection of cork bark and shaped corks. The cork oak (*Quercus suber*) is grown in the south of France, in Corsica and Algeria, but Italy and Spain supply most of the demands. There are three French exhibitors.

At the end of the court will be found samples of charcoal in all forms obtained from thirty-three different kinds of wood. The quality of the charcoal depends on the density of the wood from which it is obtained and the mode of combustion. It is carbonized in two ways, the first and most common being that practised in the forests, of burning it in piles or stacks containing from forty to fifty steres of $35\frac{1}{2}$ cubic feet each. This furnishes a hard, sonorous, and heavy charcoal, which takes fire slowly, but when ignited develops a great quan-

Charcoal.

MR.
SIMMONDS
ON
FORESTRY.

tity of heat and burns a long time. The second process consists in distilling the wood in closed vessels; but the charcoal thus obtained is inferior in quality, being friable, very light, porous, and inflammable. The manufacture of charcoal employs a great number of workmen in France, who remain almost the entire year in the forests. The production is inadequate to the home demand, and charcoal to the value of about three million francs a year is imported from Germany, Belgium, and Italy.

Tanning
barks.

Many tanning barks are shown. A. F. Michel (23) shows chestnut bark, rough and ground, for dyeing. Lamier and Lambert (22) oak and other barks. Besides these the white birch, willow bark, and larch barks are used for tanning. Algeria also supplies the mother country with upwards of two millions and a half kilogrammes of tanning bark. Carré and Nephew (10) show seventeen or eighteen bottles of ground dye-woods, and Strauss-Javal (9) dye-woods, extracts and lac.

Osier-work.

Basket-work from osiers is another industry coming under this class which is extensively carried on in France for bakers' panniers, hampers, and other baskets, sieves, &c. The great consumption of osiers may be estimated from the fact that in the single department of Seine et Marne 3,072,400 were sold in 1866. In the arrondissement of Vervins there are not less than 3,000 families who make annually more than two millions and a half francs' worth of products, two-thirds of which are exported to England and America. J. Debonnaire, of Melun (20), shows a very complete collection of osiers and basket-work in all its forms, plain and dyed. Wooden shoes are another manufacture appertaining to this class, and of sabots and galoches there are good illustrations, principally shown by two exhibitors; they vary from gigantic pairs fit for the feet of a giant to the petit ones used for children. The imitation of leather in some of these sabots is very deceptive, and wooden soles are also attached to many leathern shoes.

Wooden
shoes.

Miscel-
laneous
exhibits.

A case shown by Schmidt-Missler, of Paris (24), should not be overlooked. It contains various examples of the utilization of the needles or leaflets of the pine, in the shape of forest wool for stuffing mattresses; vegetable wool, or wadding, having medicinal uses; essential oil for rheumatism and skin diseases, cloth made of the wool, bonbons, &c.

The larger objects of casks, barrels, tuns, staves, &c., which could not be shown in the building, are exposed in a shed in the park.

Before leaving the court attention may be drawn to the door leading to the other part of this gallery, which is a good specimen of cut and fret work moulding, &c., from the works of Luard, Frapard & Co., Caen (17).

In a detached place in the machinery department of the French gallery will also be found an interesting collection of knots, excrescences, &c., and woods destroyed or injured by insects, the modes of treatment for pruning and training trees, and the instruments used in scientific culture.

The French collection of woods is further illustrated by copies of all the works published in France treating on sylviculture, and by a collection of insects destructive to trees, with instances of their ravages as shown on various woods by Dr. E. Robert (81), of Belleville, Meudon (Seine and Oise), as described in his work "*Les Destructeurs des Arbres d'Alignement*."

Of the French colonies it may be stated that Algeria shows a noble collection of woods, and there are nine large circular sections of trees on each side of the walls in the machinery gallery. Some very fine stems of the bamboo grass are shown, there is a good display of cork-bark, and natives are employed in shaping and cutting cork. French colonies.

The other French colonies, West Indian, African, and Pacific, have also a good collection of woods in this gallery in a glass case, and piled on a rectangular counter.

The island of Martinique possesses about 20,000 hectares of forest, with woods suited for building, cabinet-work, dye-woods, &c.; but owing to the want of roads, and the difficulty of getting them to the sea, a large quantity of the best wood is yearly converted into charcoal without much profit to the owners. Martinique.
Guadeloupe and its dependencies contain some 36,000 hectares of woodland. The green ebony, *Laurus montana*, walnut of the Antilles, and Campeachy wood are met with abundantly, but little worked, owing to the absence of roads. According to M. Lallemant, Lieutenant of Artillery, the best periods for getting timber are the months of August and January. In Guiana the months of September, October, November, March, and April are considered the best. There is much scientific and interesting popular information on the woods of the French colonies furnished in the special Colonial Catalogue compiled by M. Aubry-Lecomte. About 140 specimens of Madagascar woods are shown by two exhibitors, but only the common names are given, and no further information. Madagascar.
The island of Reunion shows a good collection of woods, and has about 57,701 hectares of forest on the mountains, at 1,200 to 1,500 feet above the level of the sea. A stop was put to the indiscriminate destruction of trees by fire, &c., in an ordinance published in April 1853, and much benefit has already resulted from it. The French territories in India are too well cultivated to be very prolific in wood, but still the Indian Colonies.

MR.
SIMMONDS
ON
FORESTRY.

specimens sent are not wanting in interest. The province of Bien-Hoa, Cochin China, contains considerable forests, and at Tay Ninh, where the trees are principally resinous, tar, oil, and turpentine are obtained. But it is from the forests of Cambodia that commerce may expect to derive the most important resources. A collection of 120 specimens of these woods is exhibited by M. Petit. New Caledonia possesses extensive forests. One of the most common woods is the Niaoulis (*Melaleuca Leucodendrum* and *viridiflora*), the wood of which yields to no other for strength, elasticity, and durability. The iron wood (*Casuarina nodiflora*), *Acacia* *sirobbis*, and *Thespesia populnea* are also esteemed.

Algeria.

The forests and woodlands of Algeria extend over about 3,750,000 acres, about two-thirds of which belong to the State, the rest having been granted on long leases for cork production and olive culture, or on shorter terms, ranging from fifteen to twenty years, for oak, pine, and other woods. Of cork bark about 2,500,000 lb. has been annually exported from Algeria in the last three years. Of the woods of construction two species of oak (*Q. Mirbeckii* and *Q. castaneaefolia*) are most esteemed for shipbuilding and railway sleepers.

The Australian Eucalypti, which have been introduced, thrive rapidly; and the Southern ash, common in Algeria, furnishes a wood superior in beauty and quality to that of Europe. Of the furniture woods the thuja (*Callitris quadrivalvis*) is made into articles of incomparable beauty, and has regained since the last two International Exhibitions the high reputation it had attained in the time of the Roman Empire. For cabinet-work and marquetry there are many other beautiful woods in Algeria, such as the cedar (*Cedrus atlantica*) the pistachio, the olive, the juniper, the orange, the ash, and the *Quercus ilex*, not omitting the briar root, which is used largely for the fabrication of pipes.

The various woods of Africa have necessarily a great interest for France, which consumes annually about six millions cubic metres of woods of construction, while its own forests only produce two millions. The importation of common woods into France exceeds the exportation by 100 millions of francs.

Algeria is also rich in resins, as the many samples exhibited evidence; a large number of trees furnishing gums and resins. The maritime pine, which is well named "the tree of gold" in the department of the Landes, is found in small forests on the Algerian coast; but the pine of Aleppo (*Pinus halepensis*), which is also rich in resin, covers an extent of 500,000 acres in the zone south of the Tell. Of barks of various kinds there are many which are rich in tannin, and attempts are

being made to concentrate the extract, as is done with the hemlock spruce bark in North America, so as to furnish a more useful article and save freight. The capital engaged in forest enterprises in Algeria is about one million sterling.

The process of cork cutting and shaping from Algerian cork-bark is shown by Berthon Brothers, of Paris, in the Spanish part of the machinery gallery, near the Rue d'Espagne.

Other specimens of French woods are exhibited in different localities. In a shed, near the Ecole Militaire entrance, the Imperial School of Agriculture of Grignon shows a number of samples with the bark attached, and the seeds of forest trees. In another large building, not far off, containing illustrations of agricultural products and dairy industry, is a collection of the seeds of 379 indigenous or introduced trees which have been naturalised in the south of France, with specimens of their wood and foliage.

From France we reach the UNITED KINGDOM, but the two or three exhibits there call for no special notice. An interesting collection of samples of colonial and other woods was shown by the Science and Art Department. These represent the experiments as to strength, density, cleavage, &c., made by the late Capt. Fowke, on the woods shown at Paris in 1855, and London in 1862, and the results are fully given in a pamphlet published and distributed by the Department.

The BRITISH COLONIAL COURTS are particularly strong in forest products. Of the collections of the colonies, NEW SOUTH WALES makes the best display of woods and forest products. The court is situated in the machinery gallery, close to the entrance of the Rue des Indes. The whole exterior of the court is ornamented by fine polished slabs of woods. Four high pedestals are found at the inner side of the court facing the great sections of coal from the Newcastle collieries. The durability and adaptability of the colonial woods for shipbuilding are evidenced in many fine slabs of old timber, some pieces taken from a ship built in the year 1831 show the perfect soundness of the wood used. Mr. Charles Moore, director of the Botanic Gardens, Sydney, contributes 156 specimens of woods from the northern districts of the colony, principally in the Clarence and Richmond districts. On both sides of the Clarence River, for upwards of sixty miles, there are belts of wood, but of no great breadth. On the banks of the Richmond it is not so extensive or continuous, but from the north branch of that river a rich brush woodland extends in an inland direction to the north-west and south-west for nearly a hundred miles each way, skirting more or less the vast basin

MR.
SIMMONDS
ON
FORESTRY.

Exhibits in
the park.

Great Bri-
tain.

Captain
Fowke's
experi-
ments.

British
Colonies.
New South
Wales.

MR.
SIMMONDS
ON
FORESTRY.

formed by the New England dividing range. The number of species of trees, and the size to which many of these attain in this magnificent country, especially on the table-land, is truly astonishing—some red cedars being 10 feet in diameter, and yielding 30,000 feet of saleable timber. Yet so little is known of these woods that, beyond the cedar (*Cedrela Australis*), pine (*Auracaria Bidwellii*), rosewood (*Synoum glandulosum*), ash (*Flindersia Australis*), beech (*Vitex Leichhardtii*), tulipwood (*Owenia venosa*), and silky oak (*Grevillea robusta*), nearly all the others are regarded as worthless except for firewood.

There are 195 pieces of southern woods sent by the Commission. Mr. E. W. Rudder forwards fifty-nine specimens of colonial woods, and Mr. James Barnet, colonial architect, Sydney, eight specimens and a block of ironbark as used in girders; and Mr. Frankland another block. Large quantities of this wood are shipped to India for railway sleepers. Sir Wm. Macarthur sends some slabs of wood, and a handsome library case made of colonial woods, which stands in the New Zealand Court. Mr. John Cuthbert, of Sydney, forwards a very neat case made of colonial timber, in which are thirty specimens of wood, carefully named, and Messrs. Jolly & Co., shipbuilders, of the Steam Saw Mills, Darling Harbour, a case with thirty-two samples of woods, from their property at Brisbane Water. Within and without, the New South Wales Court is filled with woods, many of the finest quality for cabinetwork, as a handsome table top standing at one of the entrances proves. The tulip-wood is especially ornamental. There are samples of many tanning barks and dyewoods. The simple and powerful character of the dyes are shown on specimens of wool, silk, and linen. The turmeric (*Zieria octandra*) is one. Among the fibres the gigantic nettle (*Urtica gigas*) plays an important part, being much used by the natives for making kangaroo and emu nets, fishing-nets, and dilly-bags. The unexpanded fronds of the cabbage-palm (*Corypha Australis*), prepared by repeated immersions in boiling water and by drying in the shade, are much prized for the manufacture of fine plait for hats. The coryjong (*Hibiscus heterophyllus*) also affords a strong and useful fibre; so does the bark of one or two species of *Brachychiton*. Many handsome walking-sticks are shown.

Natal and
Lagos.

In the courts of NATAL and LAGOS there are small collections of woods. In the latter, Mr. Edward Simmonds has brought together a very interesting series illustrative of African industry in matting and basket-work, gourds and calabashes, curious wood carvings, &c.; also fibres, dye-woods,

and colouring substances. The Natal collection comprises about 55 samples of wood, several of a very useful and ornamental character, as evidenced in an ornamental cabinet of colonial wood shown by Her Majesty the Queen from the Exhibition of 1862, and an ornamental sideboard made by Mr. Charles Buckpitt, of Maritzburg. The Cape Colony exhibited a collection of small samples of 102 kinds of wood, and some half dozen tanning barks. The varieties and properties of the South African woods are not so well known as could be wished, and many are not even yet scientifically determined.

The QUEENSLAND Court is very rich in fine samples of timber, nearly all the sides being filled with longitudinal or transverse sections of the woods of the southern and northern parts of the colony. Mr. W. Hill, director of the Botanical Gardens at Brisbane, sends 158 specimens; Mr. A. Thozet, another large collection. M. H. Marsh, Esq., M.P., exhibits two fine logs of myall wood (*Acacia homalophylla*), now much used for its violet scent by perfumers and cabinetmakers for making fancy workboxes, jewel caskets, pipes, and other articles. Mr. Marsh also contributes a very large and fine collection of small polished pieces of wood showing their applicability for cabinet and ornamental work. The woods and vegetable products sent, however, present comparatively few novelties since the date of the previous Exhibition, owing principally to the limited time allowed for procuring and preparing specimens.

SOUTH AUSTRALIA sends only a small collection of twenty-six polished woods and some tanning barks, gums, and resins. Two trunks of the grass-tree (*Xanthorrhoea hastilis*), with their long flower-stalks, at the entrance, are curious, as showing the deposit of the resin in the bark.

VICTORIA has not sent so fine a collection of woods as it might have done, and it is certainly inferior to that shown in 1862. There are stems of tree ferns placed at each side of one of the doors. Wheels and articles of turnery, myall wood planks and pipes, some interesting examples of the distillation of essential oils from the leaves of the Eucalypti, and samples of barks and paper made from various Australian woods contributed by Dr. Mueller, complete the collection of objects in this class.

CANADA has an ample display of its woods, forming one of the chief features of attraction in the court. A great deal of good taste has been displayed in the arrangement, which is made to represent a tent in a Canadian forest. The iron columns of the building are disguised so as to represent the huge

MR.
SIMMONDS
ON
FORESTRY.

trunks of trees, the roof imitates branches and foliage of the forest, and all the fittings are painted maple and walnut. The principal ornamental woods are ranged on an etagere in the centre of the court. Black walnut furnishes one of the finest woods for the cabinetmaker; it is beautifully marked, especially the blistered, wavy, and bird's-eye varieties and excrescences.

The maple, with its varieties of bird's-eye, curled, blistered, &c., is another esteemed wood. The tulip-tree, or white-wood, bass-wood, and the white or Weymouth pine, also look well polished and varnished. The butternut (*Juglans cinerea*), blistered ash, black ash, and black birch are handsome woods, especially the excrescences of the black ash and the white and blistered oaks. Small sections of the trunks of the trees are shown with the bark on, and all well named. The Abbé Brunet exhibits interesting photographs of the woods, &c. In the passage alongside of the principal court are shown enormous and extraordinary sized trunks and pieces of timber piled one on the other. The average quantity of timber annually obtained in Canada is over one million and three-quarter tons. In the forests 15,000 men are employed, and in the partial manufacture of lumber over 2,000 saw mills and at least 10,000 men. Timber further employs at Quebec about 1,200 vessels of an aggregate freight capacity of 700,000 tons, besides 500,000 tons of lake and canal tonnage. Seventeen thousand seamen are engaged in carrying its products from Quebec to Europe, and 8,000 more in their transportation on inland waters.

East Indies.

Bengal.

The EAST INDIAN woods shown are in the British Agricultural Annexe in the park. The timber exhibited from the Bengal Presidency consists of fifty specimens, collected in the central provinces, all of which are correctly named and described in French and English, with the uses to which they are specially applied. Also a collection of fifty-eight specimens made by the conservator of forests for the Meerut division; forty specimens of the most useful timbers from Burmah, and specimens from Sasseram Behar, with smaller contributions from Chittagong and other localities. The foregoing are all exhibited by the Bengal Government. The private exhibitors in this Presidency include his Highness the Maharajah of Jeypore, the chief of Punwah, and Captain Martin, of Goonah.

Madras.

From the Madras Presidency the Government exhibits a good collection, consisting of 101 specimens of timbers really in use in the Presidency for various practical purposes.

Mysore.

From Mysore a large collection of timber is shown by the

Forest Department, consisting of cross sections, longitudinal slabs, squared blocks, and turned cylinders, so that the same wood is exhibited in all conditions for examination, and each specimen is stamped with its botanical name. Superintendent Lal Baugh also contributes a collection of Mysore timbers.

The only exhibits from the Bombay Presidency consist of nineteen specimens from the Forest Ranger of Sindh, and some rough blocks from the Tanna Collectorate. Bombay.

A collection of eighty specimens of good commercial timbers is shown by the Company of the steam mills, Johore, Singapore; and an excellent series of 48 useful woods, unfortunately with merely the native names, are sent by the Hon. Colonel H. Man, of Penang. It is worthy of record that Dr. Cleghorn exhibits on behalf of the Government a large section of Deodar (*Cedrelus deodara*), with a diameter exceeding 4 ft., and thoroughly sound. J. E. Leveson, of Singapore, sends a collection of all the commercial canes which are imported from Singapore, consisting of about fifty varieties. Charcoal from various Indian woods are also shown by Captain Martin, of Goonah, and his Highness the Maharajah Holkar, of Indore, besides some Government contributions. Straits Settlements

The other British Colonies which show woods are Mauritius, the Cape Colony, British Guiana, Trinidad, and the Bahamas, all lying close together, and these five collections may be studied with advantage.

MAURITIUS sends 66 sections of wood, of which 45 are from indigenous trees. They appear to be chiefly useful building woods, and but few are of an ornamental character fitted for furniture. Mauritius.

The collection from BRITISH GUIANA comprises similar woods to those shown in 1862, including the Mora, Greenheart, purple wood, and others of a long established reputation. British Guiana.

It may be asserted without reservation that the timber and furniture woods of this colony vie with those of any other part of the world. The excellence of two of the woods, Mora and Greenheart, is acknowledged at Lloyd's, where they rank among the eight first-class woods for shipbuilding. The wood named Purpleheart (*Copaifera pubiflora*, Benth.) might, amongst others, probably be found well adapted for the inner lining or skin of armour-plated ships. From the table of exports of the colony it appears that the demand for timber has largely increased since the Exhibition of 1851, though it fluctuates considerably according

MR.
SIMMONDS
ON
FORESTRY.

to the condition of the home markets. In 1851, 177,780 cubic feet of timber were exported from the colony; but in 1861 and 1864 the exports averaged 820,000 cubic feet. Vessels of large draught of water can ascend the rivers to a considerable distance, and load timber from the woodcutting establishments. Extensive tracts of primitive forests are yet untouched, especially beyond the Rapids, the difficulty of floating the timber over operates at present against their full development. Sir Robert H. Schomburgk, in his work published twenty-five years ago, thus speaks of the woods of British Guiana:—

“The fitness of the timbers for naval architecture is remarkable, and in some instances is said to surpass that of teak. The Greenheart, the Mora, and Souari, of all other woods, are most unquestionably the best adapted for shipbuilding. Within the last ten or twelve years a considerable quantity of brown Greenheart has been sent to Liverpool and Greenock; and I have been told that builders and others interested in shipping are now of opinion, after about ten years’ trial of the wood, that in strength and durability it is superior to any oak, and it actually commands a higher price.

“Had these woods been introduced and extensively employed in the Royal dockyards fifteen or twenty years ago, it is the opinion of competent judges that we should not now hear much of dry rot and Kyan’s patent, not to mention the rapid decay of vessels built of English and African oak, and the consequent frequent repairs, with what saving to Government would it not have been connected. If, therefore, the attention of the Navy Board could be drawn to this important fact, that British Guiana can furnish the finest and most durable woods in the world, in sufficient quantities to supply all the shipbuilding establishments in Great Britain, a double benefit would arise from it, namely, the saving to Government, and the increased demand for this important production of the colony. The first experiment might be to establish a dockyard for the repair of such of Her Majesty’s cruisers on the West India station as draw not more than eighteen or nineteen feet of water. The outlay of such an establishment would be trifling if the importance of ultimate success be considered.”

Trinidad.

TRINIDAD sends two fine collections of woods, one numbering 222 specimens forwarded by Mr. S. Devenish, and another less extensive collection by Mr. H. Prestoe, the island botanist. These woods and their uses are well named and described in the special catalogue of the colony.

The following are pointed out by Mr. Devenish as likely to be useful for shipbuilding and other purposes : —

MR.
SIMMONDS
ON
FORESTRY.
Trinidad.

LIST of TRINIDAD TIMBER which might probably be applied to SHIPBUILDING.

Nos. 1 to 11 will give sidings, from 20 to 22, and averaging 28 feet in length; Nos. 13 to 15, from 17½ to 19½, averaging 23 feet in length; Nos. 16 to 20, from 15 to 17, averaging 23 feet in length; Nos. 21 to 39, from 12 to 14½, averaging 23 feet in length.

Common Name.	Scientific Name.	Remarks.
1. Mora - -	Mora excelsa -	Gregarious tree to be had almost in any quantity, but often decayed in the centre, when of a large diameter; grows in arenaceous soils.
2. Carapo - -	Carapa guianensis	Very abundant, tough and not very heavy; extensively used inside of buildings for rafters, plates, &c.
3. Balata - -	Achras Ballota -	Ditto, but now getting scarce in old cultivated districts, very common inland and along the northern, eastern, and southern coast, considered one of our best woods.
4. Cedar - -	Cedrela odorata -	Ditto. Also very common inland and on the northern, southern, and eastern coasts.
5. Lecust - -	Hymenaea Courbaril.	Ditto. The branches give excellent natural curves.
6. Galba - -	Calophyllum galba	Ditto, in several parts of the island; makes excellent planks, lasting and not heavy.
7. Gommier -	Bursera gummifera	Ditto, a little heavier than Galba.
8. Acoma - -	Sapotaceæ - -	Ditto, one of our best woods.
9. Monkey balata -	Sapotaceæ - -	Ditto, not so much used as it should be, principally worked into cart shafts, &c.
10. Balsam capivi -	Copaifera officinalis	Common in some districts, considered one of our best woods for planking of bridges and for cart building.
11. Bois gris - -	Licania incana -	Very common in most of our forests, but not generally found in the market; used in the country for posts.
13. Contrevent -	Achras sp. - -	Very common in the northern range of mountains; excellent timber, hard, tough, and durable.
14. Moussara -	Brosimum alicastrum.	Common in some parts of the island. Used for house building and for making carts, &c.
15. Tendre à caillou	Mimosa lithoxylum	Very common, and in some districts much used for flooring and for planks.

List of TRINIDAD TIMBER—*cont.*

MR.
SIMMONDS
ON
FORESTRY.
Trinidad.

Common Name.	Scientific Name.	Remarks.
16. Angelin - -	<i>Andira inermis</i> -	Very abundant throughout the island; exceedingly tough, and as such used for wheels, naves, and felloes.
17. Bois d'Orme -	<i>Guazuma ulmi-folia.</i>	Ditto, but not used, although tough and light.
18. Cyp - -	<i>Cordia gerascanthus.</i>	Ditto, much used in carpentry and also for cart and shipbuilding.
19. Guatecare -	<i>Lecythis Idatimon</i>	Ditto. Exceedingly common, dense and very tough, and much used for carts, shafts, and poles; one of the most elastic woods here.
20. Olivier - -	<i>Bucida Buceras</i> -	Ditto. Excellent for planking, not very heavy, much used for flooring of bridges and houses in the country districts.
21. Genipa - -	- - -	Very common, elastic, and tough.
22. Laurier - -	<i>Laurus Sp.</i> - -	Ditto. There are several sorts of laurier used for whale boats, oars, and masts, for shells of canoes, and also by carpenters for flooring, &c.
23. Purpleheart -	<i>Peltogyne paniculata.</i>	Very abundant in several districts, hard and dense, but seldom used except for mills, ramrods for guns, cart axles, picture frames, &c.
24. Poui - -	<i>Tecoma</i> - -	Ditto, except in a few districts and in old cultivated localities, perhaps the best, hardest, and most durable wood in the colony; much used for piles of bridges, house posts, &c.
25. Roble - -	<i>Platymiscium polystachium</i>	Very common. Excellent timber, much used by carpenters and for cabinet making.
26. Yoke - -	<i>Acacia</i> - -	Ditto. One of the finest woods in the island, much used in carpentry for house posts, furniture, and turnery.
27. Savana yoke -	<i>Piptadenia</i> - -	Ditto. Very tough and durable wood, excellent for felloes of wheels.
28. Grey savonette -	- - -	Ditto. But seldom used except for cart building; it is a very tough wood, which might certainly be used for many purposes.
29. Sea side grape -	<i>Coccoloba uvifera</i> -	Common in some parts of our coasts, where it is used for boat building.
30. Surette des Grands Bois.	<i>Byrsonima spicata</i>	Common in some districts, tough wood, used for felloes of wheels, &c.
31. Tapana - -	<i>Stillaginella</i> -	Very common, hard tough wood, excellent for ship building, cart wheels, &c.

List of TRINIDAD TIMBER—cont.

MR.
SIMMONDS
ON
FORESTRY.

Trinidad.

Common Name.	Scientific Name.	Remarks.
32. Wild tamarind (Bois mulâtre).	Pentaclothra fila- mentosa.	Exceedingly common, seems an excellent timber, but seldom worked except in some quarters, such as Caroni, where it is used for bridges, for house posts.
33. Fiddle wood -	Vitex capitata -	Very common, much used in house and bridge building, and considered one of our most durable woods.
34. Bois doux mar- ron.	- - -	Ditto, seems hard, tough, and elastic, but I believe never used.
35. Tecoma penta- phylla.	- - -	Only lately come under my notice, cannot yet say whether it is indigenous or even much found here, exceedingly tough timber.
36. Aguatapana or beef wood.	Rhopala montana -	Common in the northern range of mountains, where I believe it is almost only to be found, curious wood, excellent for house and fence posts.
37. Poirier -	Terminalia -	These two sorts of Terminalia are very common in some districts, principally along the coasts of Cedros and Icacos. They are much alike, very tough, and excellent for boat building. I have no doubt they might prove useful, wherever elasticity and toughness is required combined with lightness.
38. Amandier du bord de la mer.	Terminalia -	
39. Wild Guava -	- - -	Very common. Elastic and tough, and much used for cart poles and shafts.

From the SOUTHERN and CENTRAL AMERICAN STATES interesting collections of wood have been sent, but in most instances there is an entire absence of scientific or general information to illustrate them. The ARGENTINE CONFEDERATION shows in the machinery gallery some tanning barks, not named, and a large collection of sections of woods; but very few of these have botanical names attached.

South and
Central
America.Argentine
confederation.

There are apparently about seventy varieties, and some of them appear to be useful woods. They come principally from the provinces of Tucuman and Jujuy. Major Rickard sends specimens of fifteen of the principal woods of the province of San Juan, the Provincial Committee of Mendoza nine from that province, and the Commissioners of Tucuman and Jujuy a good collection of building and furniture wood of their provinces. Among the most prominent may be enumerated the Algarrobo negro (*Prosopis dulcis*), useful

MR.
SIMMONDS
ON
FORESTRY.

for furniture and carriages. The edible fruit furnishes chicha. The Pino curuy (*Araucaria imbricata*) is a first-class carpenters' wood: the seeds of the cones are edible. Arrayan (*Eugenia* sp.), a hard, mottled wood, said to be as good as boxwood for turnery purposes. Naranjo (*Citrus aurantium*) is also a useful wood for the turner and for the handles of instruments. Quinquina (*Myroxylon peruiferum*) the tree which furnishes the odoriferous balsam of Tolu, is an excellent wood for carpenters and cabinet work.

Noyer (*Juglans alba*), churqui, cebil, palo blanco, and Guayacan are fine mottled dark woods. Tatare, urunday, and quebracho are also first-class woods for colour and strength.

Ecuador.

ECUADOR shows a collection of about 100 woods within a flat counter case, specimens of fustic, Brazil, and other dye-woods, carved calabashes, and a very curious specimen of ingenuity in a skull carved in wood so true to nature as to deceive many. Corozo, or vegetable ivory, nuts (*Phytelphas macrocarpa*), which are now getting scarce in commerce, much to the regret of the turner, who fashions them into so many small fancy articles. Various gums, resins, and fibres are exhibited, especially the fibre which furnishes the Panama hats now so much in demand, called locally "nacuma" (*Carludovica palmata*).

The woods from Ecuador have unfortunately only the common names. It may be observed incidentally here that the woods of South America in general are more a subject of commerce for the future than of enterprise at present. The scarcity and high price of labour, with the difficulties in the way of exploration and transport to the coast, materially circumscribe the prospects of supply. Ecuador, however, has some advantages in splendid forests easy of access on the borders of the river Guayaquil, which Peru, Bolivia, and many other of the republics having forests far in the interior do not possess.

Timber is generally difficult to procure in consequence of the great cost which its felling and transport entails. At present Ecuador exports building woods and enormous bamboos, which are used for like purposes, and it also ships wood for burning.

Venezuela.

From VENEZUELA eighty-two longitudinal specimens of furniture woods are contributed by M. Aune Bosquet. The New Quebrada Company of London send sixteen specimens of furniture woods from their property at d'Aroa. There are cinchona barks from the forests of Orinoco. M. E. Thirion, the Consul of the Republic, is a large contributor, and shows, besides other objects, handsomely painted and

carved totumas, or calabashes; a table of gateado wood from the forests of Orinoco; a workbox made of palm-wood, Guayabo and Pinarili; handsome cocoa-nut cups and drinking-vessels of different forms mounted in silver; and two wooden seats or stools, made of Macanilla wood, by the Indians of the Rio Negro.

COSTA RICA shows a good collection of woods; and SAN SALVADOR about seventy specimens. Costa Rica.

From PARAGUAY sixty-three small polished samples are contributed by the Government; and Mr. Demersey sends fifty specimens and boxes made of native woods; but no information is furnished respecting these. Paraguay.

From URUGUAY Baron Maua forwards about sixteen specimens of hard woods and white woods from his estate at Soriano, province of Mercedes, on the borders of the Rio Negro. These represent the principal woods, the others being of less importance. Uruguay.

CHILI is more rich in woods than is generally supposed. In the interior valleys of the Cordilleras there are from 250,000 to 500,000 acres of virgin forests, containing trees of great dimension, fit for naval architecture, house building, and cabinetwork. Part of the specimens sent to the Exhibition (about fifty-four in number) are shown in the machinery gallery. Chili.

BRAZIL makes a very attractive display of its woods, and is beginning to devote much scientific examination to their properties and character. In the forests of Brazil are found some of the best kinds of timber for naval or civil constructions, and for cabinet-work the richest and most beautiful known to the trade. Among the first may be mentioned peroba, tapinha, cabiame or black Jacaranda (rosewood), corcunda, Brazil wood, mountain ash (sobro), bacuri, sucupira (*Bowdichia virgiliodes*), aroëiro do sertao, ipé, pequia (*Caryocar brasiliensis*), massaranduba (*Mimusops excelsa*), iron wood, cedar, laurel or bay tree, itaoba, sapucaí (*Lecythis grandiflora*), barauna (*Melanoxylon Brauna*), and many others. Brazil.

The mairapinima (*Centrolobium paraense*), saboa-rana, pao-cruz, vinhatico (*Echinospermum*) satin wood, rosewood (*Jacaranda Brasiliana*), goncalo alves (*Astronium franiniphodium*), sefastiao d'arruda, musia-pirunga, and others are excellent for cabinet-work.

Passing from the outer circle towards the inner, attention may first be drawn to a curious tea service, turned out of palm wood — cups and saucers, tea-pot, bottles, basin, &c. There is also a guitar and a flute made of the same wood, and forming part of a most complete and

MR.
SIMMONDS
ON
FORESTRY.
—
Brazil.

instructive series of the applications of the Carnauba palm (*Corypha* (*Copernicia*) *cerifera*). From the surface of the leaves is obtained a hard vegetable wax, of which candles are made. The fruit is eaten raw or boiled. A farina is obtained from the trunk, and the wood is very durable. From the fibre of the leaves are made cordage, mats, brooms, hats, baskets, sieves, &c. There is a painting showing the tree and the scenery which accompanies it. The wax is made into hard candles, which are much used in the provinces of the north, especially in Ceará. There is annually exported from Fortateza, the capital, to the other provinces and to Europe from 2,000 to 3,000 arrobas, from the port of Aracaty 30,000 to 35,000 arrobas, from the ports of Acaracú and Granja and from the interior great quantities are also sent to the neighbouring provinces. The annual export may be estimated at 12,500 cwt., and the internal consumption at 10,000 cwt., the total production in the province of Ceará amounting annually in value to about 900,000 milreis of 2s. 3d.

India-
rubber.

A lot of curiously carved walking-sticks and canes in the Brazilian Court should not be passed over. Brazil is rich in gums and resins. It is from that country Europe and the United States draw their best, if not the largest, supply of caoutchouc. The province of Para furnishes one-fourth of all that is sent into the market. India-rubber is one of the principal sources of the wealth of Para. It is obtained from the milky sap of the *Siphonia elastica*, which yields about 30 per cent. of the elastic gum. This tree grows in abundance wild in the provinces of Amazonas and Para, and is found on a smaller scale in the provinces of Maranhão, Ceará, and Rio Grande of the north. It attains the height of 26 to 42 feet, with a circumference of 6 to 8 feet. The gum is obtained by making deep transverse incisions in the trunk of the tree a few feet above the ground. In order that the sap may flow more abundantly, another vertical incision is made above reaching to the transverse cut, and oblique incisions are made at short distances running into the vertical one. The operation is assisted by winding cords tightly round the trees, which not unfrequently kills them. In a few hours the sap fills the earthenware vessels which are placed to collect it; these are emptied into others, and the sap soon thickens and solidifies by the evaporation of the watery part. It is then dried by exposure to a moderate heat, and blackened by the smoke of palm nuts burnt.

So great are the profits to be obtained that hundreds of canoes cross every year from the left bank of the Amazon to the islands and to the forests around Macassa in search of

rubber. No precautions are taken to preserve the trees, and from this cause already some districts produce a much smaller quantity than formerly. The tree, however, grows in great abundance throughout the whole valley of the Amazon and on the banks of the tributary rivers. The price varies much; it has been sold at 40 dollars per arroba, and has fallen often to 12 dollars. It is commercially classified into fine, inferior, simamby, and negro head. The price of the fine fluctuates at present between 16 and 20 dollars per arroba. The quantity of rubber exported from Para has averaged 274,000 arrobas in the last two years, 1865 and 1866. Between 1840 and 1866 there was exported from Para caoutchouc to the value of 44,138,000 milreis of 2s. 3d. each. From the milky sap of many other trees elastic gum can be obtained as fine as that from the Suringa or caoutchouc; for example, they have lately discovered, in Gumpá, that the sap of the mompiqueira or amaro da Silva gives excellent elastic gum. The botanical name of the tree is not, however, given with the article shown. The milky sap of the Mangaba (*Hancornia speciosa*) yields a very fine elastic gum, but the tree is not common, and is preserved for its edible fruit. Brazilian dye-woods are numerous, and among those best known may be cited the logwood (*Haematoxylon Campechianum*), red mangrove, *Melanoxylon Brauna*, *Maclura tinctoria*, *Terminalia tingens*, and Brazil wood (*Cæsalpinia echinata*).

MR.
SIMMONDS
ON
FORESTRY.
Brazil.

There are many resins and balsams shown, as well as medicinal and other barks; but it is from the numerous specimens of woods (most of which are scientifically determined) from the various provinces of Brazil that an idea of the importance of the flora of the empire can be best obtained. The valley of the Amazon contributes in a remarkable proportion its contingent furnished for the Exhibition of the forest riches. The province of Rio Janeiro is represented by a collection formed after five years' continuous and toilsome labour. The province of Parana occupies the third place. The Brazil woods are shown in a cleverly-arranged niche or court, representing a forest nook. In the centre the woods are erected into a trophy; on the inner sides are small pieces, and on the outer sides larger sections, of the timber.

In a small, neatly-arranged court adjoining will be found a few interesting exhibits from the Hawaiian Islands. In the centre is a table made of native woods. W. Fisher, of Honolulu, contributes a frame and box, showing specimens of wood suitable for cabinet-work. Major E. Hasslocker, Hawaiian Consul at Carlsruhe, sends specimens of various woods—a picture frame in tamana and cocoa wood;

Hawaii.

MR.
SIMMONDS
ON
FORESTRY.
—

F. Judd, polished sticks of cocoa-nut palm. The Government also sends large gourds and calabashes for domestic use, and vessels in hard wood, fans of plaited leaves, and sandals of bark fibre. Another product of some importance is the pulu fibre, as it is termed; the brown silky stipes of a species of tree fern (*Cibotium*), of which 212,000 lbs. were exported in 1866, principally to San Francisco, to be used for stuffing couches, &c.

United
States.

The UNITED STATES make a very poor representation of woods in their great court. The States of Missouri, Kansas, Wisconsin, and Illinois send small collections of samples, and Mr. J. D. Boyd, of San Francisco, forwards a few cabinet woods from California. Some fret, scroll, and ornamental sawing, mouldings, and clap-boards complete the woods. A little resin and resin oil from Louisiana is shown; and the black and grey moss from Louisiana, much used by uphol-terers for stuffing. It is an epiphyte, the *Tillandsia usneoides*, sometimes known as Spanish moss and *Barba Hispanica*. It possesses considerable elasticity, is prepared as a substitute for horsehair, and is also used by naturalists for stuffing birds and animals.

Russia.

The collection of woods and forest products from RUSSIA is principally exhibited in the outer or machinery gallery. The inner side of the Russian restaurant shows the mode of framing or shingling the sides of houses in Russia, and the whole of the fittings of the court, and the separate buildings, stables, &c., in the park, are very characteristic. There is an interesting stand of bast or fibrous products from the bark of the lime; cordage, bags, mats, sandals, baskets, horse-collars, and other articles are made of it. The thin fibre is much used by gardeners for tying plants. Millions of bast mats are used annually for baling and packing purposes. A full-sized Russian bast-mat weighs about 5 lb. when new and quite dry; is 7 ft. long and 4 ft. broad, and is made with the rougher and worst strands worked crossways, and the thinner and longer strands lengthways, in the mats. On the same stand are bowls, spoons, cups, toys, platters, ladles, butchers' trays, lanterns, and other objects made of the wood. Many of the circular boxes used to hold grain and seeds in this court are made of birch and other barks.

One collection of woods is arranged in a pyramidal form, another on a square stand. Ranged round the sides are boxes in the shape of imitation books, cleverly designed, showing the bark as the back binding, lettered with the popular and scientific names of the wood. Each box contains samples of the leaves and fruit of the tree, and a section and shaving or veneer of the wood. Besides these, there are fine full-sized

circular sections of the trees, with the implements and utensils used in arboriculture. Among other curiosities is a walking stick, with the handle carved into a pipe-bowl, while the hollowed interior forms the stem, so that the pedestrian need never be without his narcotic companion.

MR.
SIMMONDS
ON
FORESTRY.
—
Russia.

There is a counter with samples of good cut corks, by P. Jacobs, of Riga. He employs 185 men and supplies 60,000,000 corks yearly. On a pedestal is a collection of 22 specimens of the woods of Poland, furnished by the Administration of the kingdom; 53 specimens of trees and shrubs, in the form of books; and a collection of articles made of wood. Another stand contains a fine illustrative collection of the woods of the grand duchy of Finland. There are about 25,000,000 acres of woodland in Finland; and from the forests of the State there might be cut annually 11,000,000 trees, of which at least 1,000,000 would be found of very large size. The *Pinus sylvestris* is the principal tree, and furnishes the greater part of the wood shipped. The export from Finland, according to official returns, was, in 1865, 20,000,000 cubic feet of deals, 209,000 barrels of tar, and 320,000 kilos. of potash. The export of wood has doubled since 1850. The value of these exports was nearly 1,000,000*l.* sterling.

F. Idestam, of Tammerfors, shows wood paper-pulp, of which he makes annually about 200,000 kilos., chiefly for export, at the price of 7½ f. per kilo. free at Helsingfors, or 11¼ f. delivered at Lubeck.

The Ecole Forestière of Berdiansk shows thirty-six specimens of woods, illustrating the species artificially cultivated in the steppes. The Government of Grodno, sixteen specimens of woods from the forest of Bialovege.

M. Frautfettert, the director of the Imperial Botanic Garden at St. Petersburg, sends 161 specimens of woods. The greater part of the houses and constructions in Russia are made of wood; from 130,000 to 140,000 houses are built annually, and about 35,000 vessels for interior navigation, of which at least half are broken up yearly, as they rarely obtain a return cargo. The exportation of building woods from Russia reaches about one million sterling, and increases annually. The entire value, therefore, of the production of woods in European Russia is set down officially at twenty-two millions and a half sterling. Independently of the wood thus used, a good deal is destroyed—first, for the production of potash; secondly, for pitch, turpentine, and tar; and, thirdly, for planks used by wheelwrights, carpenters, and other workers in wood. These will enhance the value of the forest products already estimated by about four millions sterling more.

MR.
SIMMONDS
ON
FORESTRY.
—
Italy.

The woods of ITALY are shown in the outer circle, or machinery gallery, on two pyramids or raised pedestals. On one there are sections of wood united by hinges, so that both the interior and exterior of the tree can be seen; on the other are small slabs of building and other woods.

The number of Italian exhibitors in this class is 59. The extent of forest in the kingdom, including VENETIA, is stated at about four and a half million hectares, or one-sixth of the whole territory. About two-thirds of these forests belong to the State.

Italy, which possesses two grand chains of mountains, vast forests, islands and coasts provided with venerable trees, with its varied climate and powerful vegetation, naturally abounds in wood, which suffices not only for the home demand, but also for foreign supply. In the forests of Sardinia, Tuscany, and the Neapolitan provinces there exist shrubs which are burnt to obtain from their ashes alkali and potash. A part of the wood, however, is only half consumed, and this furnishes charcoal. The difficulties of transport and the demand for economic and industrial purposes have given great extension to this labour, which utilizes the wood, and reduces it to half its bulk and a fourth part of its weight. One perch of good coppice wood will furnish 170 lbs. of charcoal, the cost of transport of which to the seats of consumption varies from 1 to 3 centimes per 2 lbs. It may be inferred that the demand for this fuel is considerable, when we find that in a great number of the valleys of Northern Italy the charcoal is sold at 5 to 10 cents the kilogramme. Piedmont exports annually 97,893 metrical quintals of charcoal.

The wood of Lombardy and Venetia furnishes scarcely sufficient for the wants of the inhabitants. The country which produces and exports the largest quantity of charcoal is Tuscany, from which there is sent each year 220,000 pizze, of the value of 1,501,676 francs.

The wood ordinarily used for making charcoal is the oak, poplar, and chestnut. The average annual exports of charcoal from Italy in the four years ending 1865 was 350,275 metrical quintals, of the value of 100,000*l.*, but about half as much is also imported. The imports of wood for burning are 433,000 metrical quintals, or three times the quantity exported.

Cork bark is an article of export, about 4,500,000 kilogrammes being exported annually from Tuscany and Sardinia. Oak bark is also collected with great care in most parts of Upper Italy, where there are mills for crushing it to powder, in which state it forms an article of commerce. Barks for tanning and dyeing form a considerable article of

export, averaging 462,000 cwt. per annum, principally sent to England, France, and America.

The forests supply woods which are much used for agricultural implements, especially beech, poplar, willow, mulberry, oak, and elm. For building purposes wood is much less used in Italy, because it is replaced abundantly by marble, stone, and brick.

Sardinia is rich in shipbuilding woods, which are employed for the mercantile marine. The single forest of Montana furnishes yearly 150,000 cubic feet of oak, elm, and ash, woods exceedingly useful for maritime constructions and gun carriages. Sardinia supplies also annually 2,000 to 3,000 tons of large timber for the frames of vessels. The oaks, which grow in the forests of Umbria and the Marches, also furnish excellent materials for the construction of vessels, being used not only in the ports of the Adriatic, as in the shipyards of Ancona, which have acquired celebrity in shipbuilding, but also sent in great quantities abroad, especially to England. The oak thrives in Tuscany, from whence is obtained the wood most esteemed in Europe for the ribs or framework of ships, as it is very compact in its nature, and therefore exceedingly durable. The Tuscan forests contain trees of all heights and diameters, hence we obtain and import for our navy 80,000 to 110,000 cubic feet of this wood. There is also forwarded annually 20,000 to 25,000 cubic feet for use in the shipbuilding yards of Genoa, Malta, and Spain.

Among the native woods useful for furniture are the walnut, which abounds in Northern Italy, the fig, olive, maritime pine, jujube, locust, and the citron, cultivated in Piedmont and Tuscany; the maple, cherry, chestnut, oak, &c., which are met with everywhere.

BELGIUM has about 11 exhibitors in this class, but the objects have not much general interest. A frame is shown of specimens of woods grown by Baron E. Peers, of Oostcamp, near Bruges (830). Many of the veneers, planks, &c., shown come, however, under Class 58.

L. Zoude, of Val de Poix, Luxemburg, exhibits a good collection of wood for gunstocks, wheel spokes, &c.; staves and beech wood cut into all forms and dimensions. The most interesting collection from Belgium belonging to this class is a case showing the various applications of rattans by E. Van Oye van Deerne, of Antwerp. The more finished manufactured products are shown in a glass case in the main passage. A trophy of the raw material and rough products belonging to the same exhibitor will be found in the outer circle of the machinery gallery. Rattans, the commercial name for the

MR.
SIMMONDS
ON
FORESTRY.

Sardinia.

Belgium.

MR.
SIMMONDS
ON
FORESTRY.

long trailing stems of *Calamus Royleanus*, *C. Roxburghia*, and various other species of palms, form a considerable article of export from India and the islands of the Eastern Archipelago.

The rattans are shown in their natural state as received in bundles from various localities; also washed, bleached, and cut in different lengths for rustic buildings, trellis work, and canes, the bark peeled off for caning chairs, couches, carriages, &c.; the bark for basket-work and fine hat plaiting; imitation whalebone for the ribs of parasols and umbrellas, crinolines, and ladies' stay-bones; white and black varnished canes, mats made of the shavings, the same twisted, either white or dyed black, for mattresses. This manufacture had long been carried on by hand, but the exhibitor seems to be the first who has applied machinery on a large scale to all the processes required. The cane is divided by machinery into eight, nine, or as many sections as may be required for basket or cane work, or for umbrella ribs. The latter are shaped, cut, and pressed entirely by machinery. About 50 per cent. of the cane is used for plaiting-work, and the rest for umbrella ribs, which are turned, pointed, varnished, and polished. The exhibitor used up about 2,000,000 rattans last year. Fully three-fourths of the manufacture is sold in France, and a great deal goes to Brazil and the River Plate for chairs, &c. It sells for 4f. 75c. the kilo. in Paris; but in Brazil it fetches 8f. It takes four kilos. of rough rattan to yield one of finished material for caning, and the débris or waste peeled off is not lost, but is converted into "crin végétal," or twisted vegetable fibre for stuffing mattresses and making mats. As the mattresses retain no odour, but are always sweet and pleasant, they are much used in hospitals on the Continent. The cost for this purpose is about one-half less than the Algerian "crin végétal." The mats made of it are sold at 2 $\frac{3}{4}$ f. to 3f. the square metre.

In the special catalogue of Belgium, attention is drawn to the importance which the various industries connected with woods have attained, and the reduction in price which has resulted from improved steam saw-mills and other machinery. In Brussels and its neighbourhood there are a great number of saw-mills, and cabinet work is largely carried on. In Ghent there are nine, and in Antwerp and its neighbourhood five saw-mills of considerable importance. There are also many in Luxemburg. Those of St. Ode and Waninsart supply the wood for staves, and for the small planks required for the glassworks of Liège and Charleroi, while those of Poix are occupied in making the circular pieces for wheels and the stocks of guns in beechwood for exportation.

HOLLAND exhibits a small collection of woods from its Indian possessions.

MR.
SIMMONDS
ON
FORESTRY

NORWAY has, in the machinery gallery, a collection of deals of different qualities, and cornices and mouldings made of them. Considering the extent of the commerce in wood of Norway and Sweden, their forest industry is badly represented. The resin and turpentine products are, however, very well shown.

Holland.
Norway.

There is only one country in Europe—Russia—where the forests, taken in the strict sense of the word, cover a surface as large as in Sweden, where the productive portion of the forests is estimated by competent authorities at nearly 13 million hectares. Of the whole territory of Sweden, the forests comprise 32·17 per cent. As an instance of the abundance of wood, it may be stated that in two of the departments of Northland, the least wooded, Gefleborg and Westernorrland, the extent of forest is over 2½ million hectares, exceeding the extent of all the forests of Bavaria, and quadruple the surface of woodland in either Belgium or Switzerland. Fully one-third of the wood importation of the United Kingdom comes from Sweden and Norway. In 1865, Sweden exported 58 million cubic feet of logs and planks, 13½ million cubic feet of posts, 16,000 sleepers, besides a large quantity of spars, masts, yards, bowsprits, oars, staves.

Sweden.

TUNIS shows nothing but a collection of cork bark, some baskets, and brooms of date palm which sell at the high price of 2s. 4d. each; some wooden spoons, selling at 2½d., are not to be compared for cheapness or finish to those shown by Russia.

Tunis.

MOROCCO has a small collection of unimportant woods, some mats, hats, baskets, and covers for koskouscoo, made of leaves of the date palm. The baskets are ornamented with pieces of coloured cloth.

Morocco.

TURKEY shows a fair collection of samples of wood built up to form a door leading from the court into the passage. There are also some small cubes of pine in a case.

Turkey.

ROUMANIA is one of the principal forest countries of Europe, one-sixth of the territory being covered with fine timber. At the base of the mountains there are 608 saw mills, which give employment to about 900 workmen. The wood consumed annually in the country is valued at 282 million piastres, and that exported at about four million piastres. Turkey is the best customer for its wood. Roumania shows a small collection of woods, resins, charcoal, and other forest products.

Roumania.

EGYPT has, on the circular gallery which traverses the machinery department, opposite to its allotted space, a col-

Egypt.

MR.
SIMMONDS
ON
FORESTRY.

Japan,
China, and
the East.

lection of woods arranged in three columns, but these comprise nothing remarkable. There are wooden shoes and bowls, baskets, and gourds, cordage of the doom palm (*Hyphaene Cucifera*), and *Boswellia thurifera*.

JAPAN, CHINA, and the Eastern Archipelago generally have not sent many illustrations of their forest products, and yet some of their woods of construction, especially the camphor wood and indigenous pines, are curious and largely used. In a glass case in Japan there are a few articles of interest, especially in fibres, such as the palm leaf sheaths, &c., of which fine sweeping brooms are made, wooden toothbrushes, charcoal, apparently made from tree ferns, palm fans, neat wood boxes, sandals, shields, baskets, and other ornamental articles made from rattan cane, large bamboo stems, the bark of the *Broussonnetia papyrifera*, and other barks from which the tough paper is made so largely used for every kind of article throughout the country, from pocket-handkerchiefs to rainproof coats, and from small cordage to artificial leather.

Spain.

In a special building of two stories in the park SPAIN shows its agricultural and forest wealth. On a raised pedestal on the ground floor is a good collection of 150 woods in transverse and longitudinal sections, with charcoal in bottles on the top. All the woods are well named, and contributed chiefly by the Botanic Garden, Madrid, and the Institute of Cordova. The implements used in arboriculture and silviculture are shown. Specimens of cork and of the wild grass *Esparto*, which has of late years obtained such an important commercial value as a paper material in England.

There is another collection on an adjoining counter of sections of woods and seeds of trees by the *Sociedad de Amigos del Paix*, Canaries. Juan Perez sends sixty-six small slabs from the province of Pontevedra, and the corps of Forest Engineers collections of resinous products, ashes, barks, rushwork, and bundles of palm-leaves. M. Camps has a wood trophy, with sixty-two small samples of woods, some wrongly named, as, for instance, one *Musa paradisiaca*. The cones of *Pinus pinea*, the seeds of which are edible, are largely shown. There are some very fine slabs of cork on the staircase and in the upper gallery. In an inner room is a large collection of the woods of the Spanish colonies, Cuba, Porto Rico, the Philippines, &c. No fewer than 218 forest trees, chiefly of the more northern provinces, have been subjected to experiments in the arsenal of Manila, and the relative strength, tenacity, and specific gravity of the timber ascertained for economic purposes. For shipbuilding the following six are most in use:—The *Molava* (*Vitex*

MR.
SIMMONDS
ON
FORESTRY.
—
Spain.

geniculata), the Banaba, the Jacal (*Dipterocarpus*), the Dungan (a *Sterculia*), the Mangachapui (*Vateria mangachapui*), and the Quitaquita. There are two noble slabs of narro or red sandal wood (*Pterocarpus santalinus*) from the island of Mindanao, one about $13\frac{1}{2}$ ft., the other 10 ft. long, by 6 ft. wide; some good specimens of the fibrous Bahate bark, which is beaten out and used for clothing, sacks, &c.; and a large collection of Abaca or Manila hemp, in all forms, as fibre, rope, &c. from the *Musa textilis*. One object that should not be overlooked is a cane or stem of *Calamus mollis*, about 250 ft. long, which is twined round and round the stair-head. There are several kinds of bark rope and specimens of the Cabo negros, known in other parts as Ejoo fibre. This strong black horse-hair-like substance is obtained from the *Arenga saccharifera*. It is very durable and tenacious, and universally employed in the countries where the trees are indigenous for making cordage for nets, the rigging of vessels and cables. Upstairs, on the landing, is a fine collection of more than 500 specimens of the woods of Cuba, polished.

In PORTUGAL the Administrator-General of Forests shows a collection of samples of woods polished, sections of trees, and illustrations of the turpentine and resin gathering. The forests of the State cover 19,000 hectares. The largest is the forest of Leiria, of 10,000 hectares, in which the maritime pine predominates. There are no statistics of the private or municipal forests. The following was the number of trees in the national forests in 1858, without counting the forest of Bussaco, which covers nearly 1,000 hectares:—

Pins-sauvages	-	-	-	46,757,742
Pins-pignons	-	-	-	12,900,356
Oaks	-	-	-	25,070
Green oaks	-	-	-	295,376
Chestnuts	-	-	-	126,384
Yews	-	-	-	2,500
Pistacea	-	-	-	2,100
Plane	-	-	-	100
Poplars	-	-	-	418
Willows	-	-	-	100
Mulberry	-	-	-	2,820
Exotic trees	-	-	-	62

The pine is the principal tree of the forests. The wild pine (*Pinus maritima*) covered, in 1858, 14,515 hectares, and the stone pine (*Pinus pinea*) 2,182.

Close to the forest of Leiria there are the following establishments worked by the Government.

MR.
SIMMONDS
ON
FORESTRY.
Portugal.

1. A factory for preparing resin, where 120,000 kilogrammes of excellent quality are produced annually, which sells readily in the country, at Hamburg, in England, and Holland. About two million kilogrammes of resin might be made here annually.

2. A timber yard for injecting wood by Boncheni's system, where are prepared millions of posts for telegraphic lines. From twelve to fifteen millions are injected annually, that is, about 1,100 cubic metres of wood.

3. A tar manufactory, which supplies the marine arsenal, the State rope factory, and a part of the home market. Between 1860 and 1865 198 vessels were built in the three maritime departments of this kingdom.

There is a frame with upwards of a hundred samples of polished veneers, and a good collection of cork bark, rough and manufactured. Portugal also exhibits woods in a pavilion in the park devoted to the display of the products of its colonies. In the centre of the building a trophy is erected of samples of wood from India, Angola, Cape Verde, and St. Thomas, all well named. There are chairs made of the leaf-stalks of palms, fancy baskets of dyed palm-leaf, gourds, &c. In four corner glass cases are good collections of fibres and articles made from them, and in bottles are extensive collections of the gums and resins of commerce, the animi, copal, arabic, caoutchouc, &c.

Prussia.

PRUSSIA and the German States of the north exhibit little of importance in woods. Prussia has nineteen exhibitors, mostly of tanning-bark, sabots, and wood planks. The Grand Duchy of Hesse shows seeds of forest trees.

The forests in the old provinces of Prussia cover nearly 27 million acres, 1,243 square miles, or about one-fourth of the total area. If we add to this about five million acres for Hohenzollern and the newly annexed provinces, the total is brought up to nearly 32,000,000 acres of woodland. Hanover has about two million acres of forest, the principal being the Harz, Lunebourg, and Hildesheim. After Hanover comes Electoral Hesse, whose fine trees cover 1,500,000 acres. The net revenue from the forests to Prussia now exceeds 750,000*l.* per annum. The shipments of wood from the port of Dantzic alone in 1865 were valued at 4½ millions of thalers (3*s.* each). Much has been done of late in Prussia to develop the forest resources by the establishment of numerous special normal schools for diffusing information on silviculture.

Austria.

AUSTRIA makes one of the finest displays of wood in the Exhibition. Its magnificent wood trophy is erected in the park, near the Ecole Militaire entrance. Noble stems and planks are piled up in all shapes, combined with saws, axes,

and other tools and implements of the woodcutter. There are very fine trunks of *Abies excelsa*, *A. pectinata*, *Quercus pedunculata*, and other noble forest trees.

A shed close by is also filled with oak planks, scantlings, &c. of very large size and fine quality. Some Austrian woods are also shown in the building, in the raw material gallery, near the machinery court. Rosmanich, Balto, & Co., of Hungary, exhibit veneers and sections of furniture wood. E. Weiler, of Vienna, an ornamental case of veneers, plain and stained, and Hungarian ash for sounding-boards; Domaine Felscher (79) sections of trees; E. M. Podany, of Vienna, stained and ornamented veneers for fans, brushbacks, and marquetry work. Theod. Mullner (41) has a good stand of resin products, with the tools and utensils appertaining thereto: George Hirschler, of Agram (63), veneers of dark woods. There is also a case of wood-paper pulp, and samples of the woods from which it is made; but this article is referred to class 59. Some of the woods shown here have the barks and lichens on, and are exhibited in the form of books lettered at the back, as in the Russian department.

Mr. Joseph Pfeifer, of Vienna, is a large exhibitor of oak from the immense forests of Slavonia, Croatia, and Hungary, having steam saw-mills at Naschie, in the first-named district. He shows staves and bottoms for constructing a cask to hold 20,000 gallons. The 56 staves are about 15 ft. long, and 27 head and foot pieces 27 ft. long. They were cut with the axe, in 1863, in the forest of Naschie, from trees 400 years old. The wood being well seasoned, by remaining in the forest four years, the cubic metre does not weigh more than 660 kilogrammes. This exhibitor also shows veneers, planks, and staves suited for French and German casks, &c.

The State possesses in Austria about 8,000,000 acres of forest land, of which two-thirds are under the administration of the Minister of Finance, and the other third under that of the Minister of War. The State Forests comprise about 19 per cent. of the whole superficies of the woodlands of the empire. A small pamphlet, prepared by order of the Minister of Commerce and Political Economy, by Mr. J. Wessely, furnishes some interesting details of the forest riches of Austria. The total export in 1865 was 148,710 steres (of $35\frac{1}{3}$ cubic feet) of firewood, and 1,672,291 steres of building wood. Adding to this the wooden rafts and boats which are usually broken up for firewood at the end of the voyage, and the wood used for carpentering, &c., the total is set down at 1,890,000 steres, valued at 3,000,000*l.* sterling. But this forms but a fractional part of the unworked and undeveloped riches of the Austrian forests.

MR.
SIMMONDS
ON
FORESTRY.
—
Austria.

The provinces of Austria, which principally furnish wood for export may be divided into three groups:—

1. The country which borders on the Adriatic, and where the export of wood is principally by sea to the ports of Austria and Italy.

2. Galicia and Berkovina, which send their timber partly to Russia and Prussia by the Baltic, and partly to Moldavia, Southern Russia, and other countries by the Black Sea; and

3. The country of the north-west, which sends its wood by railway to the sea.

Wood pulp.

In a separate building in this part of the park was also to be seen the process of making wood pulp for paper on one of the large machines constructed by Decker Brothers and Co., of 50-horse power, working the process of Mr. Henry Voelter, of Heidenheim, Würtemberg. The exhibitor, who was the first to carry on the manufacture, has developed it on a large scale, and greatly reduced the price of all kinds of paper, by introducing from 30 to 60 per cent. of wood pulp into the fabric. He exhibits in Class 7 (2), a very large collection of various kinds of paper from wood; all white woods are available for the purpose. There are more than 30 paper-mills in Germany working up wood pulp, and there is not a journal now published there which does not contain more or less of wood pulp in the paper used.

Pamphlets.

It may not be out of place to add here a list of some of the most important pamphlets published on wood in connection with the Exhibition, although many of these are scarcely to be obtained now. I found many of them very useful in my investigations as a juror in this class. "Catalogue Raisonné des Collections exposées par l'Administration des Forêts" of France. "Notes on the vegetation, indigenous and introduced, of Australia, by Dr. Muller." "Catalogue des Végétaux Ligneux du Canada, par l'Abbé Brunet." "Les Richesse Forestière D'Autriche et leur exportation, par Josef Wesseley." "Catalogue descriptif des espèces de Bois de l'Archipel des Indes Orientales, exposées par W. L. Sturler." "Aperçu de la Végétation des Plantes cultivées de la Suède, par N. J. Andersson." "Quelques mots sur les Bois du Brésil," and "Breve noticia sobre a colleccão das Madeiras do Brasil," both by J. de Saldanha da Gama. "Notice sur le Palmier Carnauba, par M. A. de Macedo." "Tables of the results of a Series of Experiments on the Strength of British, Colonial, and other Woods, by Capt. F. Fowke, R.E." "Catalogue des Produits envoyée de Trinidad par Dr. Court." "Catalogue des Produits des Colonies Français." There were many other small pamphlets and notices issued, but those cited were the principal ones.

The recompenses given in this Class by the jurors as announced in the second edition of the award book were—

Hors concours	-	-	-	25
Gold medals	-	-	-	10
Silver Medals	-	-	-	29
Bronze medals	-	-	-	60
Honourable mentions	-	-	-	88

MR.
SIMMONDS
ON
FORESTRY
—
Number of
Medals.

212

The following is a list of the honorary awards made to exhibitors in this Class.

Awards to
British
exhibitors.

HORS CONCOURS.

New South Wales Commission.—Woods for building purposes.

Government Commission for British Guiana.—Collection of woods for shipbuilding and cabinet-work.

Government Commission for Queensland.—Specimens of woods.

Rajah of Mysore, East Indies.—Collection of decorative woods.

Madras Presidency, East Indies.—Samples of woods.

GOLD MEDALS.

L'Abbé Brunet, Quebec.—Collection of woods, herbal, and photographs of trees and plants.

J. C. Taché, Commissioner for Canada, as co-operator in this Class.

SILVER MEDALS.

Office of Inspectors of Woods, Quebec.—Collection of timber for commercial purposes.

John Millar, Montreal.—Extract of bark for tanning purposes.

BRONZE MEDALS.

E. C. Eadon, Montmorency, Canada.—Buckets, tubs, and utensils.

Science and Art Department, London.—Samples of woods experimented on.

C. J. Schearer, Montreal, Canada.—Doors and windows made by machinery.

Queensland Commission.—Collection of woods for cabinet-work.

MR.
SIMMONDS
ON
FORESTRY.
—

Royal Commissioners of Victoria.—Woods for building purposes.

Hamilton Brothers, Hawksbury, Canada.—Samples of woods.

HONOURABLE MENTION.

Shaw Brothers, Natal.—Native woods.

P. Paterson, Natal.—Native woods.

Russel & Co., Natal.—Native woods.

Landsberg, Natal.—Native woods.

M. H. Marsh, M.P. for Salisbury.—Collection of Queensland woods.

John Cuthbert, Sydney.—Samples of woods for cabinet-making.

Johore Company, Singapore.—Collection of woods.

Nelson, Wood, & Co., Montreal.—Basket work.

Isidore Champagne, Canada.—Sections of trees.

Agricultural Society, Cape Town.—Samples of native woods.

Dr. Meller, Mauritius.—Samples of native woods.

W. Jolly & Co., New South Wales.—Samples of woods and cabinet-work.

J. Dexter, Nova Scotia.—Specimens of woods and cabinet-work.

J. Bosisto & Co., Richmond, Victoria.—Essential oils.

W. H. Slater, Nunawadin, Victoria.—Essential oils.

Hagar & Co., Montreal.—Household utensils.

S. Norman, London.—Wooden boots and clogs.

S. Westlake, London.—Veneers of choice foreign woods.

L. Brown, Leicester.—Timber bent by steam.

Luc Plouffe, St. Martin, Canada.—Axe handles.

Conclusion.

In conclusion it may be stated that much valuable information was afforded to the public by the magnificent display of woods, brought together from so many different and distant quarters, at enormous expense to the several countries. Much useful information was also circulated, and diffused in one form or another respecting forest products. It is, however, much to be regretted that the valuable descriptive and statistical details, scattered over so many special catalogues and pamphlets could not be concentrated into some convenient volume of reference, as there is a great want of a comprehensive work treating on the forest products of the world.

REPORT on TIMBERS and FOREST PRODUCE exhibited in the Universal Exhibition at Paris, 1867, bearing on the value of Forestry, and the uses of Foreign Timbers compared with one another, supplementary to Official Report on Class 41, and to Capt. Fowke's Report on previous Exhibitions.—By T. W. WEBBER, Esq., Forest Depart. N. W. P. India.

MR.
WEBBER
ON
FORESTRY.

1. IN the preceding Official Report on Class 41, by Mr. Simmonds, sufficient notice has been taken of the various exhibits from all countries of this class to make further enumeration or description unnecessary.

Heads of
Report.
Forestry
and the
study of
timbers by
universal
comparison
of their
properties.

It will therefore be supposed that those interested in the class are generally acquainted with what is exhibited in Paris, as also with the results of Capt. Fowke's experiments on various timbers brought together in former exhibitions. Supplementary to these attention is here called to the objects and value of systematic forestry, and secondly, the study of timbers and their qualities by universal comparison, with notices of the many collections now in the Champs de Mars, which might afford specimens large enough for experiment, so that by degrees all the timbers of the known world may be compared together, and their qualities made known by a uniform system of testing.

2. It is remarked that the importance of this comparison cannot be over estimated, as in the colonies and distant timber growing countries means for experimenting are not available to the parties who could develop the hidden resources of those countries, and, if they were, the results would not be so valuable as those given in a universal series of experiments conducted on one principle and by the same hand, and with the attention afforded under Government sanction and ablest scientific supervision, and with specimens which have been prepared with care for an exhibition, and necessarily seasoned in their transport to Europe.

Importance
of testing
timber on
one univer-
sal system.

The experiments carried out so ably under the late Capt. Fowke, R.E., are therefore most highly valuable to the world, as an analysis of them will show, but it will also give evidence that his system of research is only in its infancy, and of the great importance of extensively prosecuting it.

The iron age of the world has not yet passed, as the enormous display of its every imaginable use would argue, but the steel age has at least commenced, so that our going back to the wooden or stone periods may seem rather a

Forestry
not obsolete.

MR.
WEBBER
ON
FORESTRY.
—

recurrence to the barbaric stages of the world's history ; but though our palaces are built of iron, and our iron roads are traversed by the iron horse of almost winged speed, and the produce of our iron machine wheels sold to all the world by signals through the iron wires which encircle it, and our very floating ships are built of iron, yet there is no reason that we should neglect the great riches of woods and timbers, and refuse to become acquainted with the qualities of the numberless trees which fill the vast unexplored forests. The fitness of iron for different uses is not so varied as that of timbers, and though the use of wood is more antique, it is not obsolete, and it enters into the thousand objects of daily necessity never to be dispensed with.

It may be questioned whether wood is not more important to man than iron, and should timber at any time through its reckless destruction become exhausted, the effect would be irreparable.

Hitherto, in the world's history, its natural production has been greater than its consumption as a necessary to man, and its destruction by clearance of the forest has accompanied the advance of men. In Europe a pause has been already found necessary, and for several centuries Government has interfered to protect the forests. When it is remembered that coal is originally a vegetable production, and that we are now consuming per century the formation of periods immensely greater before the world was peopled, in fact eating into a reserve of fuel which many million years would probably be required to replace if once exhausted, the importance of pausing in the clearing away of forests is palpable.

The fact that forests covered a primeval earth for a period of which we have evidence of its vastness, and flourished and died unseen in a manner preliminary to its present economy, is the fact, without which there would not be power to produce iron, or develop its uses as they are now developed.

Therefore, we must not throw over our old "wood" as obsolete, and no longer necessary, or superseded by "iron," lest some day "wood" may desert us, and iron become useless for lack of fuel to work it.

Forests may
become
exhausted.

4. In other countries besides Europe, not long since covered with dense forests, where the constant cutting of timber has been going on, it is already found that timber is getting scarce, even for present use, and no thought has been taken at all of the future. India, the great country of jungles, has awakened and established a system of forest conservation, but not until pine had to be imported from Norway for sleepers. America still boasts of her inex-

haustible forests and her vast clearings, and goes on hacking away. A Californian sawyer who has made his fortune in 10 years out of 100 acres of forest grant, picked on the bank of a navigable river, will tell you that the timber is inexhaustible, that his saw-mill still stands in a forest so dense that you would scarcely know a tree had been cut. And that since he came there every facing to water carriage is occupied by parties who are at work clearing their grants. But these are bare statements. It is thus that all available timber gets carried away or destroyed in the most magnificent forests, and a period comes when it is found that all the trees are cut down, and none have grown to replace them. Such a probability would have been laughed at in India 50 years ago, yet now it has actually occurred in some of the finest forests. When too late it is found that timber has a greater value than what it will actually sell for in a forest where there is abundance and a demand only for present supply, no account being taken of where it is to be obtained after that supply is exhausted, and what price it will then fetch. Therefore, systematic forest management cannot be too early set a going in a new country, based upon the principles which have been tried with the most beneficial results in European countries, and matured into almost a science after several centuries experience.

5. In France and Germany forestry is one of the State professions of the highest scientific character and regularly filled from the better and educated class who are trained for the purpose. It will give some idea of the importance attached to forestry in these countries, that France has 2,700,000 acres of State forest, revenue 1,740,000*l.*, in the conservation and management of which 500,000*l.* is annually expended. Prussia has 5,070,000 acres, Bavaria 1,962,000 acres, while the forest area of Austria is 13,000,000 acres, with an export value of 3,000,000*l.* sterling annually realized.

Systematic
forest ma-
nagement,
adopted by
European
states.

In Bavaria there exists a school of forestry at Aschhafenburg on the Maine. Here candidates for the State Forest Service (as well as many students from other countries) are trained for their profession, to which none are admitted but young men of good position and highest general and special education.

The time of training, comprising periodical and strict examination, extends over five years, one half of which is given to a practical apprenticeship in the State forests, and previous to its commencement a general proficiency must have been obtained in science and arts as taught in the highest public schools.

The special course consists of lectures on forestry, manage-

MR.
WEBBER
ON
FORESTRY.
—

ment of forests, improvements and planting operations, division of forests into blocks, valuation surveys, determination of the length of rotation, and the possible yield of a forest within the limits of its maintenance; the arrangement and carrying out of methodical working plans, the preparation, transport, and sale of timber and other forest produce.

Natural Sciences, including natural philosophy and history, botany, chemistry, zoology, and geographic distribution and physiology of plants.

Mathematics, pure and applied, with engineering, mechanics, surveying, and Forest Legislation.*

The students who pass the final examination are qualified for appointments in the Bavarian State forest service.

In France a similar college exists at Nancy, where 30 to 40 young men are trained for the State service. This consists of "conservateurs," whose pay is 8,000 f. to 12,000 f. a year, with three inferior grades of officers, altogether 849 conservateurs and inspecteurs, under whom the "Gardes Generaux," numbering 3,500, perform the work of the various Government forests all over France. This service is ruled by the "Bureau Central de l'Administration général des Forêts" in Paris.

There are also forest schools at Hanover, Neustadt, Eberswalde, near Berlin, Thurant in Saxony, and at Eisenach, as well as in other countries of Europe possessing State forests.

6. These facts will show the importance attached to forestry in the countries where the human race has reached its utmost maturity of population and civilization. It may be argued that for that very reason systematic conservation of forests has become necessary, whereas in less advanced regions it would not be so. The forests, on the contrary, require there beating down and driving back before the march of man. Experience, however, is beginning to prove that conservation is, even in thinly peopled countries, soon necessary, as it has become imperative in Europe. There, by it, forests have been restored to an area of correct proportion to the cultivation of the country; an area in Northern Europe far greater than would at first sight seem necessary, especially as coal supplies much of the fuel. Systematic conservation has also increased the production of timber in these countries so much that the supply is sufficient for home consumption and also for export to other countries. From Norway, Russia, Austria, and other places, there is a very large exportation of timber annually, yielding a considerable revenue to those states.

orest
manage-
ment is in
most coun-
tries im-
perative.
For new
countries
advisable.

* See Report by Dr. Brandis, Inspector-General of Forests to Government of India, Sept. 1866.

7. Under British rule India has lately begun to look after her valuable forests, but not until most of the teak and sal districts had become unproductive from reckless cutting, and a scarcity and consequent high price been the result. These two timbers, which, with oak and two others, rank No. 1 at Lloyd's for ship building, are only found in our Indian possessions, and an idea may be formed of the importance of forest conservation from the facts put forward in the Report of Dr. Brandis, Inspector-General of Forests in India, that the average of first-class teak trees found in a normal uncut forest at Beeling was 14 per acre, while over the entire area of Government teak forest, lately taken into management at Maulmain, 552 square miles in extent, the first-class trees which remain standing are only 15 in 10 acres, while stumps and damaged trees everywhere abound.*

MR.
WEBBER
ON
FORESTRY.

In India conservation has been found necessary when its forests were nearly exhausted.

The sal forests of Upper India might be shown to be even in worse plight through reckless cutting and utter neglect. There were in 1830 probably 4,000 square miles of purely sal forests along the foot of the Himalayas, besides those in central India available to Government. The sal timber is almost the only one found capable of standing the Indian climate for railway uses, yet now the East Indian railway has been obliged to import pine sleepers from Norway, sal being scarcely procurable. Government has therefore become alive to the importance of forest conservation in India, it being almost too late, and the work of the New Forest department will be for many years that of restoring rather than working the magnificent jungles of India. Let it be remembered that 40 years ago these forests were mostly untouched by man and supposed to be inexhaustible. Now they are simply worked out regardless of future production. My object has been to urge the immense importance of the study and practice of foresting by alluding to what has been effected by it in Europe, and how its neglect has worked in Asia; I would now bring forward another subject.

8. Xylology, if we may give it that name, has obtained special attention of late years in England, where there are peculiar facilities for, and inducements to, studying the subject, owing to the immense number and variety of untried timbers found on the sea board of her extensive colonies. And at the international Exhibitions of the last 10 years fresh collections of timbers from every part of the world have supplied the means of comparison and research.

The importance of the study of timbers and their respective qualities.

By Captain Fowke, R.E., upwards of 3,000 specimens, and 600 kinds of timber were experimented on. At the present

* Progress report of the Tenasserim and Martaban forests 1859-60.

MR.
WEBBER
ON
FORESTRY.

A few ex-
amples of
analysing
Captain
Fowke's
results,
taken from
timbers of
proved
excellence
(*vide*
Lloyd's
list).

Paris Exhibition a still finer collection is brought together of over 3,000 *different kinds* of timbers, many of them never brought before to Europe. The opportunity of testing them will not, I believe, be lost by England.

9. An analysis of Captain Fowke's catalogue is most interesting, bearing on the known value of timbers and their qualities found by experiment, also upon the distribution of the first-class timbers geographically. Timbers are classed at Lloyd's for ship building as follows (no surer practical classification exists, as it is the result of many years experience of durability and strength):—

CLASS I.—12 years' durability.

1. Oak	-	Quercus Robur	-	Europe.
2. Live oak	-	Quercus Virens	-	North America.
2. African oak	-	Quercus Africana	-	Africa.
3. Teak	-	Tectona Grandis	-	East India.
4. Morung Sal.	-	Shorea Robusta	-	East India.
5. Mora	-	Mora Excelsa	-	British Guiana.
6. Greenheart	-	Nectandra Rodeii	-	British Guiana.
7. Iron bark	-	Eucalyplus	-	Australia.

East India produces two first-class timbers, South America two, North America, Africa, Oceanea, and Europe, each one. Ever since "Robur" has been synonymous for "strength" oak has retained its place as first in the rank of timbers for strength and endurance. Its qualities are so well known that it might be the standard of comparison for all timbers. Unluckily Captain Fowke's experiments do not include any number of trials on oak, the average result of which would have been most valuable; and his trials of teak, the next practically well-known timber, are few and unsatisfactory, but still the following comparisons may not be erroneous.

1st class
timbers at
Lloyds'.

10. Let us take the qualities, specific gravity, breaking weight in lbs., and crushing weight in lbs. Capt. Fowke's Tables No. I., III., and V., give these qualities for 539 different woods arranged in order of their excellence in each respect. If we look out the above-mentioned first-class timbers in Capt. Fowke's list we find,—

Oak	-	-	-	-	Spec. grav.	-	·930
Breaking weight	-	-	-	-	-	lbs.	4,256
Crushing weight in direction of the fibres	-	-	-	-	-	lbs.	4,280
Teak	-	-	-	-	Spec. grav.	-	·695
Breaking weight	-	-	-	-	-	lbs.	4,032
Crushing weight	-	-	-	-	-	lbs.	6,571
Saul	-	-	-	-	Spec. grav.	-	·884
Breaking weight	-	-	-	-	-	lbs.	6,720
Crushing weight	-	-	-	-	-	lbs.	8,624

Oak is the heaviest of the three, and weakest under both

transverse and crushing strains, and is surpassed by 300 out of the 539 timbers tried, while teak is but low on the list in both these respects, being not half way up. Sal is a little higher only, but their enduring properties and the size to which these trees grow and their straight long grain are qualities in which they are unsurpassed.

11. The next three on the list are colonial timbers, two from British Guiana and one from Australia. In Capt. Fowke's tables they are found thus entered:—

The colonial
1st class
timbers.

Mora	-	-	-	-	Spec. grav.	·961
Breaking weight	-	-	-	-	lbs.	9,697
Crushing weight	-	-	-	-	-	9,920
Greenheart	-	-	-	-	Spec. grav.	1·089
Breaking weight	-	-	-	-	lbs.	12,215
Crushing weight	-	-	-	-	-	15,432
Iron bark	-	-	-	-	Spec. grav.	1·193
Breaking weight	-	-	-	-	lbs.	11,158
Crushing weight	-	-	-	-	-	12,264

Greenheart "*Nectandra Rodiei*," called "*Sipiru*" by the natives of Guiana, is remarkable for its durability as well as for being one of the strongest timbers yet tested. It was found to yield only under the enormous strain of 12,215 lbs. on a bar 1 foot by 2 inches square, 11,158 lbs. being the greatest breaking weight attained in the other series of 3,000 experiments (that of Australian iron bark). In resistance of crushing strain Greenheart is No. 4 on the entire list. Its growth is described as free and erect, and its grain fine and even. It is "very abundant within 100 miles of the coast, " and its timber, squaring from 18 to 24 inches, may be had " without a knot from 60 to 70 feet long." A tree of this great size, possessing a grain so fine, is most remarkable. Some idea may be formed of its strength and elasticity from the fact that the best fishing rods sold in London by Gowland, of London Bridge, are of greenheart. In the catalogue for British Guiana of the present Exhibition, at page xcvi., an interesting table of specific gravities is given in which greenheart is put down at 1·210 and Mora at 1·029. These forests also produce the mora excelsa, described as the most majestic tree of British Guiana, attains a height of 100 to 150 feet. It is so tough that "were men-of-war ceiled with this wood " little mischief would be occasioned by splinters during " action." It is also said to be exempt from dry rot, and to " be so abundant on some of the rivers that the whole of the " British navy might be reconstructed merely from the trees " which line the banks." Mora has a somewhat greater specific gravity than oak. In transverse resistance, it is found No. 6 on the entire list of timbers, and in tenacity it comes very high indeed. A considerable export trade in

MR.
WEBBER
ON
FORESTRY.
—

timber has naturally arisen from British Guiana; but forest management or conservation has probably not been thought of as yet. Mr. Holmes, the Commissioner for British Guiana, in 1855, inserted the following remark:—
 “ The colony is intersected by numerous large rivers navigable for vessels of large burden, which can thus penetrate into the heart of primitive forests, capable of affording an unlimited supply of timber, and as in many parts of the colony the trees are cut down in the immediate vicinity of these rivers and creeks, the cost of the wood which has been given (1s. to 1s. 6d. per cubic foot), wherever it could be ascertained, depends alone on the price of labour for felling and squaring.”

Question as to the possibility of exhausting these forests.

12. This was written 12 years ago. What that period has effected in the clearing out of these two first class timbers from the banks of the navigable rivers, if not all through the accessible forests, and the consequent rise in the price of the timber, is not ascertained. It is the old story of unlimited supply with a reservation, which after 40 years' unlimited cutting may turn out to be, that all the fine trees, except those in inaccessible places, are cut down, and that it takes 200 years to grow a fresh supply, which supply might have been brought up in the 40 years, had a system of rotation, well known in Europe, been from the first adopted. That it is possible in a short period, comparatively, to exhaust the most boundless forests, I would call to witness the case of the chincona tree.

Of this there were several kinds growing thickly over tracts which cover 10 degrees of latitude on either side of the Equator. It is not so many years since quinine became the valuable article it now is, and already these forests are said to be nearly exhausted, and to supply the demand for quinine it has been considered worth while to carry chincona plants to India, and plant them there in gardens. The last of the first-class trees, at present so rated, is iron bark, the well known gum tree, one of the Eucalypti of Australia. Of this there are several kinds apparently, but the best seems to be the white iron bark. All experiments place this tree at the top of the list for strength and toughness; its weight is very considerable, being one-fifth greater than water. Its durability is probably the greatest of known timbers. It is abundant all over the Australian continent, and grows erect and with bare stem to an immense height, averaging 150 feet. Its grain is long and coarse, and for a timber of construction it is unsurpassed. Including several species called iron bark, Dr. Ferdinand Mueller, director of Botanical Gardens, Melbourne, mentions 98 different kinds of Euca-

lypts found in Australia, to which, in his notes on Australian vegetation, botanical names are given. He also states that one species, "amygdalum," a tree of very rapid growth, occurs frequently 420 feet high. We are told that the hardwood forests produce, besides the gum trees, innumerable other timbers of great strength and durability. Truly, here is a field for research and profitable labour, unheard of in other countries! To ascertain the value and qualities of these numerous timbers would be most interesting and useful. Something has been attained by Capt. Fowke, and the subsequent experiments, but very much remains to be done. The above observations on the eight first-class timbers at Lloyd's, are given to show what can be said in comparing the results of the tests they have been subjected to.

13. The botanical names and geographical distribution of the other timbers in Lloyd's list, are given thus:—

The other
timbers
used at
Lloyds'.

CLASS 2.—10 years' durability.

- | | | |
|-------------------|---------------------------|---------------|
| 1. Mahogany - | - "Swietenia Mahogani" | - S. America. |
| 2. Sabiou - | - "Lysoma Sabiou" | - Cuba. |
| 3. Pencil cedar - | - "Junipersus Bermudiana" | |
| 4. Augelly - | - "Andera inermis" | - Trinidad. |
| 5. Venatica - | - "Persea Indicus" | - Madeira. |

CLASS 3.—9 years.

- | | | |
|---------------------|-----------------------|--------------|
| 1. Spanish chestnut | Castania Vesca - | - Europe. |
| 2. Blue gum - | - Eucalyptus Globatus | - Australia. |

CLASS 4.—8 years.

- | | | |
|-------------------|-------------------------|---------------|
| 1. White oak - | - Quercus Alba - | - N. America. |
| 2. Chestnut - | - Castania - | - N. America. |
| 3. Stringy bark - | - Eucalyptus Gigantea - | - Australia. |
| 4. Red cedar - | - Juniperus. | |

CLASS 5.—7 years.

- | | | |
|-----------------|---------------------|---------------|
| 1. Pitch pine. | | |
| 2. Larch - | - Abies Larix - | - Europe. |
| 3. Hackmatack - | - Larix Americana - | - N. America. |
| 4. Juniper - | - Juniperus. | |

CLASS 6.—6 years.

- | | | |
|----------------|-----------------------|--------------|
| 1. Cowdii pine | - Dammara Australis - | - Australia. |
| 2. Huon pine. | | |

CLASS 7.—5 years.

- | | |
|-----------------|-----------------------|
| 1. Baltic pine. | 2. American red pine. |
|-----------------|-----------------------|

It is interesting to note the results given by testing the above practically known kinds of timber. They show that many of them though falling off in durability possess qualities for easy working, and combine strength with lightness, which makes them peculiarly fitted for works of construction.

MR.
WEBBER
ON
FORESTRY.

Question as
to the value
of testing,
and how the
results may
be made
reliable.

Further illustration of the importance of testing and comparing the results is unnecessary.

14. Given two timbers of equal tenacity and transverse strength and specific gravity, it does not follow they are equally good. But the quality and straightness of grain and character for durability being ascertained, it is a very fair criterion as to the fitness of the timber for a certain purpose. That numerous discrepancies occur in Capt. Fowke's list, such as the same timber appearing in several places in the list under a different local name, and with a considerable difference in the results under experiment would lead one to suppose that the results are unreliable, and that testing timbers for strength is fallacious.

By way of example, if we look up these well known Indian timbers, in the list we find in Table III. the breaking weights put down thus differently:—

	lbs.
"Saul," Shorea Robusta - - -	6,720
Lower down - - -	3,464
Sâkhoo, "Shorea Robusta" - - -	4,714
Teak, Sagoon, "Tectona Grandis" - - -	4,632
Seba, Sagoon, "Tectona Grandis" - - -	3,192
Sissoo, "Dalbergia Sissoo" - - -	6,216
Sissoo, "Dalbergia Sissoo," again - - -	5,376
Tine, Dalbergia Sissoo - - -	3,780

Discrepan-
cies ac-
counted for.

15. This is easily accounted for, because collectors of specimens for exhibitions employ natives, who often, to save trouble, cut the slabs out of small trees containing sap-wood, or at best immature timber, or again out of the stem of some dead, fallen, and semi-decayed tree. Again some specimens are seasoned in large logs, and then cut out, others are cut out green and dried quickly. All these conditions affect the strength and excellence of the wood, and make experiments often worthless; but a greater number of trials on slabs cut from full grown trees, and seasoned slowly in the block, will not be found to differ much. From this may be argued the importance rather of going on extensively with experiments, and using every exertion to procure large and properly seasoned specimens.

The present Exhibition is a famous opportunity, as considerable improvement is observable in the qualities of the specimens, especially those from Austria, Brazil, and Mysore in India, as well as Canada and the colonies.

Exclusive
use of
timbers for
certain
purposes.

16. While on the study of timbers, the hundred and one uses to which timber is applied is an interesting subject, and why it is that with so many apparently like kinds to choose from manufacturers generally select one species exclusively for a certain purpose, and stick to it, at least so long as it continues sufficiently abundant. It is probably the case that

long experience has made evident the subtle qualities of each; the very best for its particular use, and though many other kinds may be nearly as good, the best will always be used, the labour of cutting out being the same. Oak being known as the timber used by his ancestors for spokes, the English wheelwright is obliged to put oak in his wheels, or his customers would not buy. Similarly there is an instinct in the wild jungle man of the Indian forest, who lives in the trees and has no settled home, to chop down the teak, if he only wants a handle for his axe, while he puts down all the other species in one category as "kutchu" and worthless. A like remark is made by Mr. McArthur in his notes on the Australian timbers exhibited in 1855. He says, regarding the cedar (*Cedrela Australis*), "The common use of this wood in joiners' and cabinet work, and its extensive importance to the neighbouring colonies and to Europe, have induced the sawyers to penetrate into every nook from whence sawn timber could be dragged out. But in seeking out this particular tree they would appear to have neglected all the rest." The other kinds of cedar brush trees are described as of unknown number and of excellent quality as a rule. These, however, are practically ignored as timber trees at all.

17. A curious instance of the way in which particular timbers hold their own for exclusive use is that in these days of small arms, when each nation is vieing with its neighbour in the perfection and extensive adoption of new rifles, the stocks, which in match-lock days were walnut, are walnut still. It is probable that among the numerous kinds none have exactly the qualities possessed by walnut for gun stocks, i.e., strength, toughness, and a certain weight. Similarly, box, of which there is a large trade from the Eastern Mediterranean, is used for wood engraving and tool handles; pine, from the mountains of central Europe, for sounding boards of musical instruments (there are nine exhibits of sounding boards in the Austrian section alone). The fronts of violins are made of this pine, and their tone and value much depends on the excellence of the wood.

The different properties of timbers as propagators of sound is most curious as well as important to the makers of stringed instruments, and has received much attention from them, as their manufacture, especially that of pianofortes, is a most extensive one. Organ builders also have tried and adopted different kinds by which beautiful modifications of tone are produced.

Beech, a not much valued timber commonly, possesses

Instances of
the esta-
blished uses
of particular
timber.

MR.
WEBBER
ON
FORESTRY.

peculiar properties which make it most important to the mechanic for certain tools, and for the facing of cogs in the driving wheels of steam engines it plays a most useful part, and is found to stand the enormous friction of the iron which it works against better than brass or iron itself. It also has the property of continuing sound under water for a very lengthened period. The uses of oak are too numerous to mention; its great durability, when exposed to all weathers and wear is its valuable feature, and sufficiently known to make further instances unnecessary. A collection of facts illustrating the time which oak timber will continue sound in building or marine construction would be most useful and interesting. A case of specimens of oak cut from different old ships is exhibited among the marine constructions, but without description. Prussia also exhibits examples of decay of oak. The ages of oak trees on record compared with that of other kinds, and the rapidity of their growth in various soils, latitudes, and positions, is also a most interesting study in itself.

Also the various methods of rendering timbers durable by driving out the green and noxious sap, and introducing preservative mixtures into the grain, are important. It is now nearly ascertained that by such processes the lightest deals may be made to last as sleepers, even in the tropical climate of India, as long as the most durable kinds. There is an interesting collection of specimens exhibited by Dorsett and Blyth,* showing the condition of sleepers of deal impregnated with sulphate of copper, after several years wear under heavy traffic. The results are highly satisfactory. The importance of this discovery for a country like India, where strong light timbers abound (close to the lines of railway), but which otherwise would not stand one rainy season, is obvious; on the East-Indian line creosoted deal sleepers have been tried with excellent results.

Finally, with reference to the hundred and one uses of woods and the extensive trades which employ each its particular sort, attention may be called to a few of the many exhibits in the Exhibition, such as the manufacture of corks from "*Quercus suber*," baskets from "*Salix*" "*Bambusa*," wood pencils from "*Juniperus*," wooden shoes, of which there are considerable exhibits from parts of France, chair-bottoms of cane; casks, beer barrels and tuns of oak, of which there are very large quantities made in France, Germany, and England, by which countries specimens are exhibited. The

* 12, London Street, Fenchurch Street, London.

cask-making machine, used in Bass's brewery, is a most perfect and valuable contrivance.

MR.
WEBBER
ON
FORESTRY.

There are exhibited felloes and spokes of wheels cut in a machine and the whole fitted together. Gun carriages which have to bear the great strain of heavy ordnance in various changes of climate and over every country. Ornamental carving, furniture, cabinets, for making which a great supply of veneer wood is required, of which mahogany from Honduras still forms the staple, over 30,000 tons being annually imported to England; but birdseye maple and several American kinds are also in much use. Specimens may be also seen of articles of extensive trade and nice manufacture which require their particular woods, such as toys, billiard cues, cricket and raquet bats, bows and arrows, violin bows (of which one of great excellence may be worth 10*l.*), ramrods, pipe stems, boot-pegs and lasts, saddle-trees, fishing-rods and apparatus, oars and sculls, boats of all kinds, blocks and pulleys, masts and spars (of which one may fetch 100*l.*), carriage pannelling and shafts, tool-handles, bandboxes, packing-cases, and other articles of trade innumerable. Besides, attention might be called to other products of the forest, to which important and extensive place is given in the Exhibition and in commerce, *e.g.*, gums, resins, and oils, charcoal, tan stuffs, tar and varnish, staples, mattings, and fibres of trees from all countries, without end.

18. Having treated generally of forestry and timbers, it may be well to go into the progress made by each country as illustrated by the sections of class 41 in the Exhibition. Exhibits of different countries.

19. France exhibits specimens of the typical timbers of Europe. "*Quercus pedunculata*" and Robur, six "*pinus*," "*Abies*," "*picea*," and "*Larix*," as timbers of construction. A section specimen of oak, "*Q. pedunculata*," measuring 6 metres in girth and 287 years old, is an interesting illustration of the growth of oak in France, and the system of ascertaining its age by the number of rings. There is also a good collection of ornamental woods, polished, typical of the European kinds, olive, walnut, yew, holly, maple, cherry, elm, poplar, and cedar. The models and illustrations of the method adopted by the Forest Department in the Vosges forests, of getting out mature timber from the pathless recesses of the forest, are most interesting, and worthy of attention by colonial settlers, and foreign workers of forests. The pamphlet called "*Les Bucherons et les Schlitteurs des Vosges*," par Theo. Schuler, may be had at Rothschilds' Library, 45, Rue St. André des Arts. The slides called *chemin de schllite* which are constructed

MR.
WEBBER
ON
FORESTRY.
—

from the hill forests, down to road or water carriage, are formed of long straight pine logs laid down double, and 3 feet apart like rails, and with smaller transverse pieces laid on top and pegged on roughly, but securely, about one foot apart. The incline of the slides varies according to the ground from 3 to 10 feet per 100, so that men can guide the sledges, on which logs are lashed, at a steady pace. The sledges are 10 feet long, and light enough for a man to carry one up again on his shoulder to the forest. Small timbers are loaded on a single sledge and brought down by one man guiding it in front, but longer logs are lashed on two or more sledges. Thus by a cheap and simple method, the largest trees are brought out of otherwise inaccessible places. France also exhibits corks, resins, basket and coopers' work, and there is an experimental collection of charcoals made from five kinds of oak and 28 other species of trees.

Algeria.

The French colonies begin with Algeria, which exhibits some splendid sections of the African cedar, "*Cedrus Atlantica*," a tree which may well rival its relatives from Lebanon and the Himalayas. Their grains and lasting qualities seem alike. The Algerian measures 15 feet in girth, and the wood has a peculiar odour when cut. The French appear not backward in utilizing the various kinds of bamboo for basket and mat makings. There is a fine collection, six varieties grown in Algeria, which includes the Nepâl bamboo, or ringal, a most beautiful hollow species, 30 feet long and one inch thick, which comes apparently from the Himalayan stock. It grows in Nepâl on high, cold, altitudes, where much rain and snow falls, and would doubtless grow well in any part of England, where its value would be great, both for basket making and a beautiful underwood. Algeria would produce a quantity of cork equal to the whole of the rest of Europe, of the finest quality. The "*Chêne-liéges*" forests cover 322,000 hectares, and the present export equals 1,150,000 kilogrammes of cork annually. The oaks used as timbers of construction are "*Quercus mirbechii*" and "*castaneaefolia*," and there are many beautiful cabinet woods. The total area of forest is 1,444,076 hectares. "Gum trees," "*Eucalypli*" from Australia, have been introduced with success.

French
Guiana.

French Guiana exhibits 130 slabs of splendid timber, of which "*Bois violet*," "*Copaifera bractata*," and "*Wacapou*," "*Andira anbletii*" are the finest. A table comparing their elasticity and breaking strength with oak and Indian teak is given in the Catalogue as follows:—

					Elasticity.	Resistance to Rupture.
Oak	-	-	-	-	1,000	1,000
Teak (superior)	-	-	-	-	2,000	1,920
Teak (ordinary)	-	-	-	-	1,100	1,330
Timbers from Guiana.	Angelique	-	-	-	2,250	1,830
	Coupe	-	-	-	1,760	1,650
	Bois violet	-	-	-	2,250	2,650
Courbaril	-	-	-	-	4,000	2,825
Beech impregnated with sulphate of copper	-	-	-	-	1,420	1,100

Showing the excellence of these timbers. The Courbaril, "Hymenœa courbaril," especially. The violet grain of "Bois violet" is most beautiful; also that of the "Wacapou." Some polished doors and a cabinet of the latter well deserve their medal. The "Caryocur glabrum," a splendid yellow timber, is also worthy of notice, besides a dozen other magnificent long grained, hard, and apparently first-class woods, all of which have been tested by the French, as above. The other colonies exhibit large collections, of which quassia from Martinique, vatica from Cochin China, and several kinds (there are 120) from Madagascar, are most worthy of attention. The other French colonies exhibit,—Senegal, 42 kinds, Guadaloupe 130, and Martinique 118. There are, besides, collections of East Indian timbers, and from Réunion. All are scientifically named and catalogued.

22. Prussia exhibits the usual European timbers, of great growth and excellence. Bavaria has a good show of deal sounding boards, and light wood cut into matches and thin sheets. One pine stem is exhibited 270 years old, and three metres in girth. Germany.

23. The Austrian exhibit of forest produce is the finest of the European collections. The white pine sounding boards for musical instruments are unsurpassed; and maple and other veneer woods of beautiful grain are cut so fine that they can be stamped with patterns like leather. In the Park "Abies excelsa" and "Pectinata," exhibited by the Staats Försterraltung in upright stems 12 feet in girth, and as straight as a mast, are noble examples of the growth of European timbers. The trunks of Quercus pedunculata and Fraxinus excelsior and Abies excelsa are unsurpassed, the first being 80 feet long and 2 feet square. There is one log of oak 13 feet in girth and 6 feet long, without a flaw, and several of the Pinus sylvestris 12 feet long and almost perfect cylinders. These may be exceptionally fine specimens, but, as showing what timber Austria.

MR.
WEBBER
ON
FORESTRY.

ought to be, if properly grown and cared for, they are worthy of the State which transported them to Paris, and of its forest management. It also shows its oak cut into staves for casks, and a method for collecting resin from small and worthless pine trees, which is deserving of description, being economical and calculated to get the utmost yield of this useful product. The bark is stripped 2 feet high the first year and 4 feet the second year, and so on, but only half round the tree, so as not to kill it. Sloping chops are made with a hatchet to conduct the resin towards the reservoir at the butt. In Croatia and Slavonia, the forests, comprising 2,400,000 acres, seem remarkable for the fine oak which they produce. There are two kinds "pedunculata" and "robur," confounded in commerce, but here distinguished as white and black oak. The former grows tall and straight to an ordinary height of 114 feet, and produces 300 to 500 cubic feet of measured timber, the latter is slower and not so lofty in its growth, but harder, stronger, and superior for naval purposes. The Sapin, "*Abies pectinata*," is said to attain here an ordinary height of 275 feet (70 metres). The export of timber from Trieste grown in the forests of Illyria, and known as "Trieste timber," is considerable, and it is principally from the "*Celtis Australis*."

Spain and
Portugal.

24. Spain exhibits specimens of *Quercus ilex*, with a peculiar radiating grain, also of the cork oak; and the Spanish colony of Cuba shows "*Cæsalpinia coraria*" (black wood), "*Acacia arborea*" and a beautiful ebony, "*Brya ebenus*." There is a splendid collection from the Philippines of over 200 kinds. The finest is of the "Bois de Maria," a kind of *Pterocarpus*, of which two slabs are shown 12 feet by 6 feet wide, and 4 inches thick, of a colour brighter than mahogany, and finer grain. Portugal exhibits 125 specimens, the olive and "*Quercus lusitanica*" being the best ornamental woods, and, from the forest of Leira, covering 25,000 acres in the Estramadura under Government management, are 80 specimens. Its colonies, Angola and Mosambique, exhibit, the former a good collection, including "*Diospyros*" (ebony), "*Swietenia*" (mahogany) *Trichostachys*, and *Zanthoxylon*, beautiful cabinet woods, and the latter "Ebeno Escuro" a most beautiful claret and rose coloured timber like a *Dalbergia*.

Norway and
Russia.

25. Norway, famous for its pines, sends from Haneborg and Christiana, fine planks and boards, which deserve their gold medal. Russia has its Government forest administration, its forest schools, and its forest revenue of four millions annually. There everything is made of pine wood. Houses, of light deals and with shingle roofs, furnished with white wooden furni-

ture and utensils, all redolent with tar and turpentine, and excellent for their lightness and cheapness.

26. From Wurtemberg, the machine exhibited by Voelter for paper making out of wood fibre is apparently a most valuable and efficient contrivance. In it, by means of a rotating stone, the wood, principally poplar, is reduced to a very fine pulp, which makes really excellent and inexpensive paper.

27. From Poland, very neat specimens of European timbers are shown cut into books, showing the heart wood, sap wood, and bark, and containing inside the flowers, fruit, and leaf.

28. From Finland are splendid typical specimens of the well-known Baltic red pine, "*Pinus sylvestris*," most durable here on account of the cold and rugged country which grows it. One specimen with a grain as close and hard as box, counted 518 seasons, and measured no more than 70 feet in height and 6 feet in girth. This was cut in 60° 50' north latitude. The "*Pinus abies*" is more lofty, 100 feet and 7 feet girth, at 160 years of age. The most hardy tree of Arctic climes, the birch, here grows with a grain marked curiously, like elephants' teeth. The forests of Finland cover an enormous area of 2½ million acres, or rather *covered*, for unluckily in this great timber producing country, the too common belief in inexhaustible supply of timber prevailed, and the forests were lately discovered to be desolated from neglect and want of systematic management. It was only in 1859 that the State forest administration was instituted to remedy this state of things, and for many years its work will be one of restoration, an example to other countries of wasted resources.

29. Italy has a very fine collection of European timbers, among which the classical "*ulmus*" holds its ancient place. It adds to the ornamental woods "*Buxus*," "*cupressus sempervirens*," and the beautiful grained *arbutus* as well as olive and chestnut, *Taxus baccata*, *Zizyphuss*, and *Liburnum*. This country was early distinguished for its knowledge of forestry and the replanting of trees where old ones have been cut down, as described by Virgil in his *Georgics*, than which nothing better probably could be written on the subject.

Roumania excels in yew and walnut, of which woods a table has its gold medal. Turkey has a fine collection, but without European names or catalogue: and Egypt exhibits its "*Acacia Arabica*," "*Salix*," "*Balanites*," &c., each useful in its way.

30. Having seen so much of the old European timbers, which by this time ought to be well known to our side of the world, we enter with advantage on the more varied and

MR.
WEBBER
ON
FORESTRY.

Wurtem-
burg.

Wood and
pulp paper.

Poland.

Finland.

Italy.
Roumania.
Turkey.
Egypt.

America
United
States.

MR.
WEBBER
ON
FORESTRY.

extensive collections from the American and other continents abounding with new and almost untried and beautiful woods. The United States, famed for its extensive timber resources, makes but a poor show, Wisconsin and California being the chief exhibitors. From the former pitch pine, white and red pine and cedar, oak, *Quercus alba*, and curled maple, are the best kinds. The shingles for roofing $\frac{3}{8}$ inch thick, and 18 inches long, of which one maker calculates he had turned out 2,000,072,061 up to the year 1860, are good and well suited to their purpose.

California exhibits some very beautiful veneers of its laurel of different shades, but they are stained. Its ash, poplar, hickory, and walnut are magnificent, and the Californian "Big tree," said to measure 96 feet in girth, can never be surpassed in its great proportions.

Brazil.

31. Brazil has, perhaps, the finest show of timbers, both of construction and ornamental work, in the Exhibition, consisting of nearly 300 different species. The specimens, too, are well saved, and cut in sizes sufficient to show the habit of the trees, and properly suited for experimenting. The collection well merits its gold medal. Of the larger sort, the magnificent "*Andira ambletii*," and "*Artocarpus species*," are unexcelled, also "*Brosimum cordura*." There is a plank 4 feet wide of a splendid red timber fit for any furniture, called "*Echrospermum balthasarii*." The *Araucaria* and "*Cedrela braziliiana*," are fine light timbers. The "*Cordia ancocalyx*," has a grain and hardness equal to box apparently, and the "*Dalbergia nigra*" is a beautiful rose wood. The kinds of acacia and satin wood are equally excellent for cabinet work, as is also the "*Hymenaea hieronima*" and the Brazil palm. The well-known Brazil wood from "*Cæsalpinia echinata*," is only one of the many dye stuffs. These forests cover an area one half as great as Europe. The gums, resins, and other forest products are abundant. Venezuela has been awarded the bronze medal for a collection of 82 specimens of exquisitely grained and coloured woods, including a black and rose wood, also a beautiful zebra wood; but the pieces are entirely too small for experiment, and the scientific names are not given. Such collections seem to answer no good purpose. Paraguay has received a bronze medal for a like collection. The woods are beautiful and well worthy of attention. There is a small collection named, including "*Acacia angico*," "*Cordia zebra*" and "*Cobaifera officialis*," which are unsurpassed as cabinet woods. Nicaragua and Costa Rica show small specimens of equally excellent appearance. Haiti shows "*Gris-gris*," "*Acajou*," and fustic, large timbers.

China exhibits four, camphor wood, "*Santhal*," and

"Corail," the last, a fine grained timber of construction. But its principal industrial product, under Class 41, is Chinese bamboo work, which in that country occupies a position of great importance. Japan, a country known to produce excellent timbers, does not exhibit any. There are, however, some cabinets inlaid with grained woods, showing several beautiful kinds.

England, from its maritime position and formation, has fuel and timber always within reach. Hence no great necessity existed for keeping up the forest area, found necessary in other European countries. Hence the forests of oak and fir, which once covered the greater portion of Great Britain and Ireland, have long since given way to the plough, and the soil turned to the production of food for the ever increasing population. Mr. Evelyn, in a well known discourse delivered in 1662, in the Royal Society, "of Forest Trees, and the Propagation of Timber in His Majesty's Dominions," complains at that date of the extirpation, nearly completed, "root and branch, of all those goodly forests and woods which our more prudent ancestors left standing for the ornament and service of their country." And the threatened want of timber for ship building, whereby "one of the most glorious and considerable bulwarks of this nation (the navy) will, within a short time, be totally wanting to it." That the prophecy of two centuries back has not been realized, is due to our colonial advantages and the use of iron. It shows, however, that the importance of forest conservation had begun to be felt even in England. It was only in the 27th year of Henry VIII.'s reign that the Church lands were confiscated, and their immense forests cut down; and during the Civil War, beginning 1642, many Royal forests, as well as private woods, were entirely swept away. In Ireland it was even later that the forests which covered the south and west, where the stumps of the trees still exist buried under the surface, were cleared, principally for iron smelting. Hence, as Mr. Evelyn's treatise evidences, attention began to be paid to the preservation and cultivation of timber, and the private parks which adorn our country everywhere, were planted, and the supply has been kept up.

It is to its Colonies and Indian Empire, however, that England is principally indebted for timbers of construction; and though English "Heart of Oak" still holds its own for excellence and durability, only a small quantity of it is now used comparatively to foreign kinds. No English woods are exhibited. Amongst colonies, Canada has a very fine collection of timbers of construction, of which the great pines, 50 feet long, and 2 feet square, are noble specimens. The

English
colonies.
Canada.

MR.
WEBBER
ON
FORESTRY.
—

collection of ornamental woods is excellently arranged, the slabs being large, and both polished and unpolished. It has been purchased by the Prussian Government. There are 186 kinds altogether, named scientifically, and catalogued. Of the timbers of construction, there is one oak, "*Quercus Alba*" (among 6 species). The pines are numerous and excellent. There are "*Pinus Strobus*," and "*Resinosa*;" the hemlock spruce ("*Abies Canadensis*"); "*Picea Alba*," American larch; "*Thuja*" and "*Juniperus Virginiana*," called white and pencil cedar, besides five other conifers. Of ornamental kinds are many splendid woods, black and yellow walnut, hickory ("*Careya Alba*"), blistered ash, a most beautiful timber. Also the "*Fraxinus Sambucifolia*" black ash, hard and soft maple, rock elm and black birch. The importance of its forest produce to Canada is greater than to most countries. As coal is not found in its centre, timber has to be used as fuel, for smelting, and in steamboats and engines, for housebuilding and roadmaking, &c. A quotation from the "*Forest Annals*" for 1855, shows that the Government of Canada is quite alive to the importance of forest management, and of the present opportunity given by the Universal Exhibition of "uniting in one place all the products of different countries of the globe, and presenting them to industry and commerce." For this object, the Canadian collection is most valuable and highly commendable.

British,
Guiana.

From South America, British Guiana exhibits a fine collection of 38 kinds, of which nine were previously exhibited and experimented on. The "*Mora* and *Greenheart*" have already been described. "*Silverballi*" ("*Oreodaphne*"), "*Simiri*" ("*Hymenœa*"), and bullet tree ("*Sapota Mulleri*"), are the other timbers of construction, and "*Purple Heart*" the French "*Bois violet*" ("*Copaifera bractata*") is undoubtedly excellent for cabinet work. There is a good deal of furniture shown in the Exhibition of this exquisite timber, beautifully inlaid and polished. It is deservedly becoming fashionable for its rich colour, beautiful grain, and fitness for inlaying. It is possessed of great strength and elasticity, and is said to stand the strain in mortar beds better than any other timber, excepting *Greenheart*. In the report published in the catalogue a regret is expressed that a larger collection of woods had not been sent to Paris, adding, "It would be easy, however, to procure samples of most of them, should any person desire to have them with a view to bringing them into use." The advantage of proving and testing these splendid timbers, and making them known, is fully appreciated by the colony. If, as already demonstrated, some of

them are twice as strong and durable as oak, it may be advisable in time to work the forests systematically, and preserve them from destruction, so that the greatest present profit may be realized, and a supply secured for the future.

The export of wood from British Guiana has increased from 177,780 cubic feet in 1851, to 816,812 cubic feet in the year 1864. And a trial of over 25 years has confirmed the reputation of these timbers for ship building. The other forest products are numerous and valuable; oils and gums, of which there are 12 kinds, including "Balata," (from the "Mimosops Balata," or bully tree, which has been found to equal gutta percha; 20,000 lbs. of it were exported in 1865), also "Gum Animi." There are several excellent tan stuffs, and 11 kinds of fibres, suitable for cloth or rope manufacture. This country is certainly rich in its vast forests, and Government may do well not to neglect their working, or leave it to chance.

35. Trinidad exhibits "Angelli" (Andera Inermis), a second class timber at Lloyd's; "Cedrela Odorata," a kind of mahogany; Red mangrove, and a satin-grained Stercula, besides excellent teak and other kinds. Honduras does not show its mahogany; nor is there any record of how this most important of timber trades has been effected since the previous Exhibitions nor as to the condition of the forests. The imports to England alone are 38,000 tons yearly. The other West Indian timbers used for ship building are nearly approaching the first quality; they include "Lysoma Sabiou," from Cuba; "Juniperus Bermudiana," as also "Venatica" ("Persea Indica"), from Madeira. Bahamas show, "Lignum Vitæ," zebra, ironwood, and pine of good quality. West Indies.

36. From Africa, a country whose central forests are boundless, there are but two collections, from the Cape and Natal. The kinds used at the former colony are worthy of attention, being excellent woods. The largest are "Stink wood," "Oriodaphne bullata," very like oak, and said to equal Greenheart from Demerara, a yellow wood, "Podocarpus Thunbergia" for interior construction. The hard woods are "Vepris Lanceolata" (ironwood) used for sleepers, and "Gardenia." Africa.
Cape of Good Hope.

Olive and Cape box ("Ellastrus buxifolia"), sandal, and ironwood. ("Millettia Caffra") are beautiful grained kinds, fit for engraving and inlaid work. For furniture, saffron ("Eleodendron"), assagai ("Cartissia faginia"), and ebony ("Enclea pseudébenus"), are unsurpassed. A very pretty cabinet inlaid with 24 kinds is also exhibited. Few of these have as yet been tested, and doubtless many other South African timbers might be collected.

MR.
WEBBER
ON
FORESTRY.
—
Natal.

37. Natal exhibits 50 varieties, all as yet untested. Here, as at the Cape, stinkwood holds the pre-eminence. Red milk wood ("Mimosops obovata"), is said also to surpass oak for ship building. There is a splendid plank of sneeze-wood ("Pteroxylon utile"), equal in beauty of grain to the best bird's-eye maple. Ironwood, black and white. Saffron ("Eleodendron") and camphor wood are beautiful cabinet timbers, as well as Red ivory wood ("Rhamnus flavesceus"). From Western and Central Africa there is nothing, and no gums. Of the latter, those regions send a rich supply to commerce, as shown by C. Clarke and Co., 35 Camomile Street, London, Gum Merchants.

The true "Gum Animi" is from Zanzibar, called fossil, because found in the ground, where it has long survived the trees which produced it. Gum copal, from Angola coast and Sierra Leone, and Gum acacia from Senegal and Mogador. Of these there is a very large export to Europe. Of Gum Arabic alone, much of which comes from Africa, 3,000 tons are annually brought to England. The trade in cocoa-nut oil is too well known to need comment—(10,000 tons of it are imported to England yearly, and other products of this palm, coir, and fibre are considerable articles of commerce). From Mauritius there are 66 sections of woods, 45 of which are indigenous. None of these kinds were tested by Capt. Fowke. The present specimens are unfit for experiment, but longer pieces might be procured.

Australia.

38. Australia ranks first among timber-producing countries, both on account of its extent and variety of climates, and the immense number of valuable trees which are found in its vast forests, numbering, it is said, 1,000 distinct species—726 specimens are catalogued against 408 shown in 1855. Dr. Mueller, however, in his report on the vegetable products exhibited in Melbourne, previous to their being sent to Paris, says of those from that colony, "that the wood samples comprise representatives of barely one half of the timber trees known to exist."

Three collections from New South Wales, Queensland, and Victoria are the same as those experimented on by Capt. Fowke after the Exhibition of 1855. Considerable additions are made of new kinds, as follows:—

Woods exhibited in 1855 and 1867.

New South Wales	-	-	300	360
Victoria	-	-	45	107
Queensland, South	-	-	123	156
North	-	-		95
Gippsland	-	-		8
			468	726

There are several small collections besides these.

69. The timbers of New South Wales, including 54 kinds of Eucalypts, or gum trees, with the often-mentioned iron Barks and other hard woods grown in the colder south, have been tried and described, as also the cedar brush trees "Cedrela," "Araucaria," "Synown" (rosewood), "Flindersia" (ash), "Vitex" (beech), "Owenia" (tulip), and "Grenellia" (silky oak), from the northern districts, all valuable timbers, especially the first, of which some fine slabs are shown, resembling mahogany, from the north of Richmond river. Some trees here are said to measure 10 feet in diameter, and to yield 3,000 feet of saleable timber (*vide* Catalogue). The tree nettle ("Urtica Gigas"), and a fig resembling the banyan of India, have measured 42 and 87 feet girth respectively. Still much remains to be done in exploring these forests.

MR.
WEBBER
ON
FORESTRY.
New South
Wales.

40. From Victoria, specimens of 107 kinds, including two private collections, are shown. These are mostly different from the 45 kinds tested by Capt. Fowke, and also from the 55 kinds catalogued at Melbourne, so that there is here field for further testing. Dr. Mueller, in his interesting notes, describes the "Eucalyptus Amygdalina," to have attained in the valleys of Dandenong, and on the Yarra river, the height of 420 feet. He says, "these trees do not" exceptionally rise to this amazing height, but, contrarily, "very many, in the deep recesses of the mountains advance" to the same magnitude " (and this we see repeated in regard to other tall kinds of Eucalyptus, in other parts of the country). He also says, "the extraordinary dimensions" of the trees is not so much the result of very great age, "but extreme rapidity of growth." What number of years it would take to mature one of these great trees would be most curious to have ascertained. Dr. Mueller does not state from what grounds, whether observable in the annual rings seen in section, or actual registration of age, he infers great rapidity of growth. But old world experience would argue that trees of fairly rapid growth may live and increase for 1,000 years, without being half the above dimensions. There are trees of even 2,000 and 3,000 years' growth on record. Whether an exogenous plant, increasing in layers, or rings, from the outside, can put on its rings at a more rapid pace in Australia than in Europe, or of a thickness sufficient in a short time to produce a big tree, which at the same time will have a hard and homogeneous consistence is a subject worthy of the greatest attention in a forest point of view, to the colony, or whether this faculty is the property of the Eucalypts, wherever transplanted, would be so to the world in general; certain it is that the grain of these great

Victoria.

MR.
WEBBER
ON
FORESTRY.

trees is peculiarly hard, tough, and said to split with the utmost difficulty, and that their strength and durability is undeniable. One fact would go to prove their quick production, *i.e.*, the prevalence of gum vein in the timber in concentric circles, between the successive layers of the wood, which unfortunate defect is said to be common in many of the Eucalypts. If so, rapid growth and consistence of structure cannot be combined in these as in other timbers. The white gum tree and stringy bark (*Euc^{ts}. Stuartiana* and *obliqua*), are said to exceed 300 feet in height, and to cover the plains and more barren mountains of Victoria. The ornamental woods shown are numerous, among which, "*Senecio Bedfordii*," a curious striped wood; and "*Banksia Serrata*," marked with net work; and "*Acacia Melanoxylon*," are not to be overlooked. The subject of inquiry and experiment concerning these wonderful forests and their products, is therefore by no means exhausted. A great advance has, however, been made since 1855 and 1862 in the scientific distinction and naming of all the various species, in which Dr. Mueller seems to have been active. And careful testing can now be gone on with more satisfactorily, there being no doubt as to the names. The use only of the colonial names to distinguish the Eucalypti in Capt. Fowke's list, takes away from the certainty of his results. Dr. Mueller has also brought together a splendid collection of gums and barks, wood fibres, tan stuffs, wood, oil, and tar, from many different species, which point towards great commercial advantages. Of oils alone there are 30 species, principally from Eucalypts and *Melaleucæ*, possessing valuable solvent and lubricating properties, of which it is stated any quantity might be obtained. West Australia has not contributed to any exhibition, therefore it is impossible to say what this great country produces in the way of timbers. Suffice it to mention the Karri Eucalypt of that country, described by Dr. Mueller as 400 feet high.

Queensland.

41. From Queensland, the southern collection, up to No. 123, is identical with that of 1862, tested by Capt. Fowke; 33 new kinds are added. The Melbourne catalogue, however, gives an entirely new collection, by Mr. Hill, Botanical Gardens, Brisbane, of 153 kinds, mostly different; while Dr. Mueller describes 95 kinds from North Queensland, principally distinct from the above, a few of them only are identical. The descriptions, carefully compiled and with scientific names, will be found in the "Reports and Awards" of the Jurors for the Intercolonial Exhibition of Australasia for 1866-67." These forests are remarkable principally for their coniferæ, the Moreton bay pine, "*Araucaria Cunninghamii*." Also "*A. Bidwillii*," and the "*Kawrie*,"

and Cyprus pines. Also the beautiful "Casuarina." There are many tropical kinds for cabinet work. "Eremophila Mitchelli," (called sandal wood), "Rhus Elegans" (yellow wood), "Acacia Excelsa" (rose wood), "Acacia pendula," and "Melanoxylon." "Eucalyptus maculata" and *lignum vitæ* are the most beautiful.

42. From Gipps Land there are nine useful woods, including *Eucalyptus longifolia*, said to last in the ground 20 years, and to resemble iron bark; "Acacia Supporosa," an elastic wood resembling hickory, and yielding straight spars 50 to 100 feet long. From Tasmania the 18 woods exhibited in 1862 have not been added to, nor have scientific names been given. Doubtless, this island produces excellent timber. Its stringy bark and blue gum, under test for transverse strain, were not inferior to greenheart, and many more kinds remain untested. New Zealand also has failed to come forward with her forest produce. There are, however, some excellent private collections from other colonies. One of 30 kinds from Sidney, by John Cuthbert, being worth attention; and another of 32 kinds, by W. Jolly and Co., of Darling Harbour, Sidney, from whose steam saw-mills sleepers have been supplied to India. Their catalogue is practical and interesting. Borneo and the Eastern Islands do not exhibit.

Gipps Land
and Tas-
mania.

43. Last, but not least worthy of notice, in Class 41, comes our Indian exhibits, from the various forests of India, Burmah and the Straits.

East India.

44. From the last, Singapore exhibits 71 specimens of unnamed timbers, apparently of kinds little known, but most likely practically useful, as they are sent by the Johore saw-mills. These should certainly be named and tested. Penang sends 40 specimens, numbered, but not named, apparently of excellent quality. To them the above remarks are also applicable.

Straits
Settlements.

45. A catalogue might supply the names and descriptions, but unluckily no Indian catalogue is yet procurable. Official reports, however, on the various Government forests of India, are numerous and most interesting. These and the botanical works of India must be drawn on for the descriptions of timbers exhibited, and for some additional remarks on the forests, which may not be uninteresting.

Indian
timbers
described
variously.

46. Capt. Fowke's experiments include 70 local names of timbers. Some of these are not of general significance, being in the Hindee, Burmese, Tamil, or other language, totally distinct, which is given to the tree in the district where it is cut; hence there is much confusion always in India as to the identity of species called by several different appellations. Even the scientific names are often not certain, as so many botanists have written on Indian plants, and

Experi-
mented on
by Captain
Fowke
under un-
certain
names.

MR.
WEBBER
ON
FORESTRY.
—

given different names to the same species. Therefore, no great reliance can be placed on the collections from India, unless they are known to be made by a botanist, and, to make specimens of real value, the dried leaves and flowers should accompany them. In Capt. Fowke's list, the scientific names are added, in many cases from the native names, not from actual identification of the tree botanically, *e.g.*, black sissoo is marked "*Dalbergia Sissoo*," its grain being that of "*Dalbergia latifolia*" (Saj is called "*Terminalia Arjuna*," its grain being that of "*Terminalia tomentosa*"). Contrarily Saul is named Sakhoo, Surreye, and Sâl, so that the scientific names may be incorrectly added; the district or country in which these names are applied being not specified. This should certainly be done, mistakes may occur in transcribing native names, *e.g.*, the name of a place, "Philibeet," is given to "*Nauclea Cordifolia*" (the Huldoo tree), the specimens having come, doubtless, from Philibeet, in the north-west Provinces. The same tree is called in another place "Huan," but in what language is not mentioned. Thus, "*Acacia Sirissa*," appears in the list as two trees, "*Sirris*" and "*Tseek Tha*;" "*Tectona grandis*," as "*Sagoon*" and "*Kuyen*;" "*Pterocarpus Dalbergoides*," as "*Beejah*" and "*Padowk*;" and "*Nauclea Parviflora*," as "*Kaim*" and "*Htein*," without any explanation that these are the Indian and Burmese names for the same tree, found in the forests of both countries; and that the apparent discrepancy in the result of testing the wood of these specimens of the same species, is probably due to the totally different climate and soil of the two countries.

The names of the countries where timbers are produced should be added.

Indian woods are numerous, but only half represented.

47. To rectify this confusion, the name of the country whence the specimen came from should be added, as also a description of the tree and its place of growth. No better plan can be adopted than that used in Australian catalogues.

48. The Indian collections at the present exhibition are poor and by no means represent one quarter of the Indian timbers. Among Capt. Fowke's Indian list, only about 40 distinct species are found, and the present collections comprise not twice that number, whereas in the French collections of products of French colonies, specimens of 223 distinct species from the French stations on the coast of India are exhibited, properly classified according to the natural orders named and catalogued. A better list of Indian timbers cannot be found, as far as it goes. It may be seen in the official catalogue of French colonies. The whole of the timbers found in the tropical Deccan, central India, Bengal, the north-west, and Punjaub, in the sub-Himalayan ranges, stretching from Assam to Cashmere, the colder elevations, and the snowy ranges, would number three times that

A more
complete
collection
from India
desirable.

amount; besides the distinct Silva of the Burmese continent, the Straits Settlements and Ceylon, amounting, probably, to as many more species.

49. It is therefore disappointing that the proposal of the late Secretary of State for India, Sir Charles Wood, was not carried out for the benefit of the present Exhibition. His circular, published in 1864 and 1865, directed the Governors of each province to send slabs of *all the timbers* in their provinces cut 6 feet long and the whole width of an average tree, and accompanied by the dried leaves and flowers. The expense and trouble of this collection, *if duplicates were left out, from closely adjoining provinces*, would be trifling for a government like India, and all further confusion would have been avoided, but unluckily it fell to the ground, or only a few well known kinds were sent.

Mysore.

50. Of local collections, that by the Mysore Government cannot be too much commended. Slabs on Sir Charles Wood's plan, of 75 species, are shown; those even of the ebony and other slow growing trees being 13 inches across and $2\frac{1}{2}$ inches thick, and necessarily of old and seasoned trees. The names both native and scientific are printed and numbers stamped as well in case of the labels coming off. This collection contains many of the most valuable timbers of the Deccan, including teak, rosewood, and ebony; also the exquisite purple "Hardwikii Binata," of which there is a plank 15 inches wide. Experiments from this collection on Capt. Fowke's principle, would give perfectly undubitable results.

51. The Forest department of Central India, has also, a fair collection of pieces, large enough to afford one experiment of each kind, all properly named.

Central
India.

52. Meerut forest department shows 75 specimens of smaller sizes, which is unfortunate, as there is no certainty of such small widths being from mature trees. The collection is interesting, being the first which includes the following Himalayan timbers:—

Meerut.

No. 39. "Rai," *Abies Smitheana*.

40. "Ootees," *Populus ootees*.

41. "Akrote" *Juglans* (hill walnut),

46. "Papree," *Buxus* (Hill Box).

49. "Salou," *Pinus excelsa*.

50. "Raisalon," *Picea Webbeana*.

52. "Sandham," *Dalbergia Ougeinensis*.

53. The Maharajah of Indore has a fair collection of 64 kinds of like size. Madras Government shows 55 slabs of much too small size.

Indore,
Madras.

54. British Burmah shows 113 kinds, of which "*Dipterocarpus grandiflora*," "*Shorea obtusa*," and "*Lagerstræmia*" are worthy of attention, besides the well-known kinds.

British
Burmah.

MR.
WEBBER
ON
FORESTRY.
—

Dr. Brandis in his report on the Atteran forests (March 1860) gives a most interesting description of the trees found in these regions, in which he expresses a wish that the wood of the "*Lagerstræmia*" ("*Pubescens*," called "*Laizali*") should be tested. He describes it as a tree often attaining 15 feet girth. He also speaks highly of the Padawk, "*Pterocarpus dalbergoides*," which attains a girth of 15 feet, and occurs with teak at 15 and 7 first-class trees per 10 acres respectively in Upper Salween forest. There are three oaks, "*Quercus semiserrata*," "*Amhersteana*," and "*Lappacea*," and a poisonous "*Antiaris*" described as 38 feet in girth and 250 feet high.

History of
the forest
department
in India,
Bombay,
and Madras.
Teak
forests.

55. The first records found of Government interference in regard to the working of the forests of our vast Indian Empire date from 1800. In that year the Court of Directors authorized the Bombay Government to assume the same right which had been exercised by the previous Government of Tippoo Sahib, *i.e.*, the exclusive royalty of the forests of that Presidency; and in 1806 a forest conservator was appointed. There is no account of how the management was conducted up to 1822, except that all working of the jungles was prohibited. In that year the forests were thrown open to the public, and the conservatorship abolished. Consequent on this step, and the total neglect by Government of the subject, it was discovered in 1830, that, owing to indiscriminate cutting, teak timber for Government purposes was getting scarce, both in Madras and Bombay. Only in 1837 the Board of Revenue addressed the Governor of Madras on the subject, in reference to a report on the Travancore forests. From this report it appears that the Rajah of that territory had retained his sovereign right to the forests, and appointed an English conservator, whose system was the following. "For any 10 teak trees, fit to cut, two were to be left for seed, and for every tree actually felled, 10 were to be planted." During 20 years of this regime the Rajah had derived a regular revenue, and his forests then contained, in 1837, a full supply of first-class teak trees, while the forests in British territory were in course of exhaustion. Of these latter he prophesies their destruction if thrown open to contractors and all who wish to cut. The only restriction was one rupee per tree levied by the landowners, and a small export duty by Government. In 1839 Mr. Williams, dockyard manager, reported to the Bombay Government that in 21 months 40,000 teak trees, between 12 inches and six inches diameter, had been floated down by the contractors, who were allowed to cut indiscriminately, and that the supply of large timber fit for shipbuilding was scanty. But it was not till 1840, and on the urgent representation of the many

persons sent to report on the condition of the forests, that a conservator was again appointed, and a tariff of duty established, payable to Government, on timber exported, which would have the effect of preventing the destruction of the forest by the cutting of all the young trees. The prospects of reproduction of the teak trees had become so bad through the above neglect that Government was advised to purchase 260 square miles of forest land for replanting with young teak for the use of the Government dockyards. This was actually done in 1842. Several plantations were attempted, but it was found that the expense of planting an acre of land with teak was greater than the value of the timber likely to be produced, after 100 years, on a square mile. The British provinces of Malabar, Canara and Goojerat, Bombay, Madras, Rajamundry, Coimbatore, and Cochin, containing teak forests of vast extent, stocked with first-class trees fit to cut, and a natural growth of young trees reproducing themselves, and capable, with proper management, of yielding an ample supply without any chance of deterioration, had in these 30 years been given over to destruction. The Board of Directors in their prohibition of interference on the part of Government, believed that free trade in timber was advisable, and likely to develop the resources of the country, forgetting that if both young and old trees were cut down, the trade would no longer exist. It never was at all probable that contractors or lessees of the forests would be likely to leave any trees which they could sell, standing, for the benefit of the contractors of 100 years' subsequent date. And the growth of timber is so slow, that even owners of the soil will not plant or spare young trees for the benefit of a future generation. It is therefore manifestly the duty and province of Government to exercise the necessary restraint over the forests to insure that a sufficient number of young trees be left to take the place of the mature trees cut down, and also that the old trees which bear and scatter the seed for reproduction be not all cut away. This is the work of the Forest Department now established all over India.

56. In Burmah the teak growing districts are, Pegu on the Irrawaddie, and Sittang rivers, comprising 7,312 square miles of forest. Tenasserim and Martaban include 520 square miles of jungle on the Salween river banks. The first record of these forests dates from 1827, shortly after the country was occupied. In that year Dr. Wallich reported to Government on the forests visited by him. He describes the forests as being uncut, and very fine. He recommends that all teak forests be reserved strictly for public use. He adds: —“ Unless this principle be acted on at the very outset, I “ will venture to predict that private enterprize will very

Burmah
teak forests.

MR.
WEBBER
ON
FORESTRY.

“ soon render fruitless all endeavours to perpetuate supplies
“ for the public service; and one of the principal and most
“ certain sources of the revenue will be irrecoverably lost.”

In 1829, however, Government threw the forests open to the public, any person being permitted to take out a licence to fell on payment of a duty of 15 per cent. of the value of timber when cut. Certain restrictions were imposed as to size of trees to be cut, and an obligation to plant a certain quantity. These restrictions, however, were a dead letter, as in 1841, Mr. Blundell, the conservator, was censured by Government for resuming some forests in which the conditions had not been observed, and directed to reinstate the licence holders. It being frequently urged on Government that this system was most destructive, the licence holders having no interest themselves to consider the future welfare of the forests, 100 years leases were tried with no better effect, and it was not till 1853, when the teak trade had become too important to Burmah to be longer neglected, that a final settlement of the question was made by the Establishment of Government Forest Management for the whole of Burmah under one head conservator. The attempt was made to work the forests in part directly by means of a paid establishment and contractors. But this was found expensive, the surplus of four years' work, 1857-60, being only 65,796 rupees. The present system was introduced by the conservator, Dr. Brandis, in 1860.

The forests of Pegu were divided into six divisions, of over 1,000 square miles each, containing approximately 100,000 1st class trees in each division. The 2nd, 3rd, and 4th class trees each take 24 years to become 1st, 2nd, and 3rd class respectively. Therefore, in each division, if one quarter of the 100,000 1st class trees be cut every sixth year, taking the six divisions in rotation at 25,000 trees yearly from the divisions worked the forest will have yielded all its mature timber in the 24 years required to bring on a fresh supply. In practice, 20,000 trees only are cut, some old trees being left for seed. By a system of forest surveying, described in Dr. Brandis' most interesting report on Attaran, 1860, conducted by the forest officers, it is discovered that the teak forests, though of a very scattered character, contain a certain quantity of trees of each class, generally 100 of 1st, 2nd, and 3rd each, and 200 of 4th class trees, per square mile. Therefore, by cutting only 80 of the 1st class, and leaving 20 for seed bearers, as well as all the younger trees, which are protected from fires as much as possible, in 24 years the forest is renewed, and in a rotation of 120 years, or the age of a 1st class tree, the stock is entirely replenished. It is an important property of teak, that when green, it will not

float. Thus it is easy for the forest superintendents to check the cutting in this way. In the division to be worked, the officers of the forest department mark and girdle the trees to be cut, three years before the working season of that division; so that the proper trees, only, are in a state to cut and remove, being dead from the girdling, and dry enough to float. Permits are then issued to parties who are willing to cut, and drag to the rivers, by means of elephants, the dry timber at so much per log floated down to Rangoon; no further trouble or expense being incurred by Government. The result of this system is, in British Burmah, that the export of teak timber, which would have undoubtedly come to an end without Government supervision, is now kept up briskly. The expenses of a very large forest establishment employed in conservation work, which will tell 100 years to come, are paid (in 1865-66 they amounted in Burmah to 31,194*l.*); and a large profit accrued to Government (in that year it was 58,655*l.* for our Burmese provinces). So much for teak forests under the Forest Department.

57. A short allusion to the Sâl forest of India may not be out of place. In central India, on the Nerbuddha river, extensive Sâl forests begin to take the place of teak, which does not occur further north than Jhansie. Along the whole sub-Himalayan range, up to 3,000 feet elevation, and in a belt ranging from five to 20 miles wide, at the foot of the hills, and over 1,500 miles long, dense forest is found. Wherever the soil is elevated and dry, this is nearly pure Sâl forest. That tree, unlike the teak, monopolizes the soil, and by its dark green foliage prevents other trees from growing with it. In Kumaon, Oude, and many of the Nepal jungles, as many as 70 1st class trees per acre have been found, besides young trees from seed, at 200 or 300 per acre, growing up with the old. It is a strange fact that since British occupancy of this tract, the accessible forests have been mostly cleared of large trees. This was effected by the contract system, by which the forests, the undoubted property of Government, were leased out for a term of one year annually to the highest bidders, giving them a right to cut whatever they pleased. The revenue brought in by this plan was quite insignificant, timber being plentiful until each successive lessee had taken what he could out of his piece of jungle, and finally no more trees remained to be cut. Under these circumstances, the jungles have at length been made over to the Forest Department, as the manifest scarcity of timber made it imperative to adopt some measures. It is needless to say that the contract system was abolished, and a regular forest management established in the Punjaub, Rohilcund, Oude, Goruckpore, and central provinces. The forests north of Oude have been

Indian sâl
forests.

MR.
WEBBER
ON
FORESTRY.

ceded to Nepal, whose prince, Sir Jung Bahâdour, more long-seeing than the British Government, has reserved all the forests, no one being permitted to enter them, even, without special leave, and no timber has been cut in them for centuries. It has, however, turned out, perhaps, advantageously, as these vast Sâl jungles (several 1,000 square miles) contain abundance of the finest trees, which may prove of untold value, as a reserve of timber capable of supplying the market in times of scarcity. Some idea may be formed of the size of the Sâl trees growing in the Nepal hills, from the fact that the ferry boats used every where on the Gogra and other branches of the Ganges, are formed of single logs, hollowed out, and floated down from Nepal, one of which holds 10 to 15 men, with cattle and horses, costing 50 to 100 rupees purchase from the Nepal boat makers. That country is not surveyed, but estimated roughly; its sub-Himalayan belt of Sâl forest, extending from the Gogra to Sikhim is 900 miles long, and 10 to 30 miles wide. The higher hills contain immense tracts of pine forests, including "*Pinus Longifolia*," called "Dooop" by the Nepalese, also four other kinds, and a larch, "*Larix Nepalensis*." The British Sâl forests may roughly be computed as follows:—

Central Provinces	-	-	-	2,000 square miles.
Kumaon and Gurhwal	-	-	-	600 „
Dehra, Dhoon, and Binjore	-	-	-	400 „
Oude	-	-	-	250 „
Goruckpore	-	-	-	300 „
Bootan Dooars	-	-	-	unknown.

The general character of these, however, is that few large trees remain standing. The young trees are abundant, and likely to afford a large supply in 50 or 60 years' time, and there is sufficient yield at the present to pay for conservative expenses. The forest revenue and expenditure of India, in 1865-66, is given for that year in the last budget returns as follows:—

	Receipts.	Expenses.
Government of India	£13,212	£2,998
Oude	11,997	5,877
Central Provinces	13,327	10,783
Burmah	89,849	31,194
Berar	1,797	923
Bengal	3,865	4,529
North-west Provinces	61,141	27,222
Punjaub	3,068	27,106
Madras	36,588	25,642
Bombay	100,761	77,505
Total	£367,682	£213,779

58. Considering how the forests have become exhausted, this is no inconsiderable return. To class it as a source of revenue, which costs 57 per cent. in collection, is manifestly putting the question of how forests are to be worked productively, in a wrong light. The expenditure incurred is not cost of collection, but expenses of an establishment employed to restore the forests which have been nearly cut down. The facts above referred to (that the teak forests now contain but one and a half first-class trees per acre, instead of 14, and the Sâl forests no first-class trees, instead of 70 per acre, the normal number), show that the forests are not in bearing condition, and therefore the revenue now accruing from them is not a normal one at all, or in any way approaching to what it would be were the forest in bearing. It must also be borne in mind that both Sâl and Teak trees take 100 years to grow ; therefore, to expect a full revenue, for many years to come, is absurd. Planting has been recommended by most of those who have studied the subject, in which case, manifestly, the full time would have to be waited for a return of mature timber. To say nothing of the cost of getting the trees into the ground, and their care for so many years, which is manifestly greater than that of merely preserving the young and half-grown trees already standing in the natural forests, it is the province of Government to hold those large and far-seeing views of correct rule, which are commensurate, not with the life or interests of the individuals of the day, but with the time required to develop the resources of the country governed. Therefore it may be argued that Government should spare no expense to restore again the exhausted forests, with a view eventually to working them on approved and paying principles, and not look for a present revenue, which may further exhaust those forests for the sake of a small present gain ; and at the expense of a very great future profit, to both the country and the Government, which it is most probable will accrue, judging by the results of systematic forest management in Europe. The analogy of India (if not the colonies), to Europe, is closer than that of England to other countries, where forests are in the hands of the State. The forests in both are self-reproducing. In England they are planted. These circumstances have led to a late proposal on the part of the Inspector-General of Forests in India, to train young men in the French and German Forest Schools, both practically and theoretically, with a view to their holding appointments in India, in the forests. This will be of immense advantage to that country, as hitherto the English system of cutting down trees and planting them again has been too much the idea in India and caused the

MR.
WEBBER
ON
FORESTRY.

Indian
forests are
exhausted,
and no
return can
be at present
expected
from them.

MR.
WEBBER
ON
FORESTRY.

damage. But the first and most important and unpalatable change to be instilled into the forest administration in India, will manifestly be, that in future forests are to be preserved and fostered, not cut down, and consequently no revenue must be expected from immature timber, and no expense spared, which will be repaid at a future time, no matter how remote. This will require a considerable increase in the Forest service, which is totally inadequate to the work to be done, and men will have to be engaged who are scientifically acquainted with forestry. Otherwise the old shortsighted policy of cutting down all the trees may at any time and at once cause the destruction of what years have accomplished.

Questions
of planting
and thin-
ning con-
sidered.

58. The questions of planting and thinning require further consideration. So early as 1842, in Burmah, at a time when representations had been made to Government as to the evil effects of the system then in force, of general cutting, plantations of teak were formed in Attaran to remedy the evil. The teak was found to grow freely from seed, but so little care was taken of the seedlings that in 1845 but one tree was found alive. Plantations have since been established in many places, both in southern India and Burmah, and the seedlings were found to attain in two years from the date of sowing, a height sometimes of 32 feet and 13 inches girth. In his interesting report on Altaran (1860), Dr. Brandis calculates that to make teak plantations profitable after 62 years, the total outlay per acre should not exceed 67 rupees. The actual outlay was, however, over 600 rupees per acre, and the total amount hitherto planted may be reckoned by a few acres; so that Government planting as a method of restoring the exhausted forests, is a failure. In England plantations of slow growing trees may be said to succeed, but these are made under totally different circumstances. The planters are the hereditary owners of the soil, and are induced to plant and protect their trees for their own interest, for the sake of the shelter and beauty they create. In India luckily the forests reproduce themselves. If they are worked properly there should be no need of planting. A much more important forest operation to India might, however, be tried with success, *i.e.*, the thinning out of the young trees where too thick. This applies to the Sâl jungles of the north-west, where, so far from sowing being necessary, the saplings grow naturally at 300 and 400 per acre. No attempt has hitherto been made to thin out these over crowded tracts, which are very extensive, all the attention of forest officers being turned to the cutting down of the big trees wherever found. Unwillingness to incur a small outlay, without immediate return, may also have been the cause of neglecting an operation found so

beneficial in Europe. It is, however, probable that thinning may be tried before long. All these facts go to prove the importance to the world of studying everything connected with the supply of timbers generally, and discovering the qualities of the new kinds which may be required to replace the old kinds when exhausted; therefore, remarks somewhat extended have been made on them. The timbers found in the British hill provinces of Kumaon and Gurhwal, and the Punjab Himalayas, are not represented in the Exhibition, which is unfortunate, as they are little known. A collection of 70 varieties was sent to the Agra Exhibition of 1866 by the writer. This included the deodar (*Cedrus deodara*), which is found there of immense age and size, 40 feet girth and 250 feet high. Its timber is nearly imperishable. The banks of the Sutledge have been nearly cleared of deodaras, for railway purposes, and though 10 per cent. of the trees only reach the plains, by reason of the rocks in the river, the cost of cutting and floating down is much more than paid. The "*Pinus longifolia*" "Cheer pine" is the next tree of value in the Himalayas, as it occurs over all the lower hills, covering an area of several thousand square miles. Its timber is equal to Norway pine, and it is proposed to use it for sleepers on the East Indian Railway, and experiments as to its lasting qualities, when impregnated with creosote, have been successful. It only remains to make a rough enumeration of the kinds of timbers now brought together in Paris, which may show how wide is the range for experiment and comparison.

LIST of COUNTRIES exhibiting SPECIMENS of TIMBERS in the Universal Exhibition at Paris, 1867, and the Number of distinct Species shown, approximately.

Country.						Number of Species.
EUROPE	France	-	-	-	-	70
	Austria	-	-	-	-	20
	Spain	-	-	-	-	20
	Portugal	-	-	-	-	125
	Germany and Russia	-	-	-	-	20
	Roumania	-	-	-	-	160
	Total	-	-	-	-	395
ASIA	Cochin China	-	-	-	-	100
	Turkey	-	-	-	-	150
	China	-	-	-	-	10
	Mauritius	-	-	-	-	66
	Sassaram	-	-	-	-	16
	Mysore	-	-	-	-	76
	Central India	-	-	-	-	50

MR.
WEBBER
ON
FORESTRY.

List of Countries—*cont.*

	Country.	Number of Species.
ASIA—<i>cont.</i>	Indore - - - -	64
	Burmah - - - -	113
	Singapore - - - -	71
	Penang - - - -	40
	Meerut - - - -	57
	Madras - - - -	35
	Total - - - -	858
AFRICA - - - -	Algeria - - - -	60
	Madagascar - - - -	120
	Senegal - - - -	42
	Egypt - - - -	40
	Cape - - - -	50
	Natal - - - -	50
	Total - - - -	252
AMERICA - - - -	French Guiana - - - -	130
	Guadeloupe - - - -	130
	Cuba - - - -	200
	United States - - - -	30
	Brazil - - - -	300
	Venezuela - - - -	82
	Paraguay - - - -	41
	Nicaragua - - - -	59
	Costa Rica - - - -	70
	Canada - - - -	186
	British Guiana - - - -	30
	Trinidad - - - -	10
	Honduras and Bahamas - - - -	30
	Total - - - -	1,298
OCEANEA - - - -	New South Wale - - - -	360
	Victoria - - - -	107
	Queensland - - - -	156
	Queensland, North - - - -	95
	Gipps Land - - - -	8
	Tasmania - - - -	40
	Philippines - - - -	200
	Total - - - -	966
EUROPE - - - -		395
ASIA - - - -		858
AFRICA - - - -		252
AMERICA - - - -		1,298
OCEANEA - - - -		966
	TOTAL - - - -	3,769

REPORT on PRODUCTS of SHOOTING, of FISHING, and of the EARTH WITHOUT CULTURE.—(Class 42.)—By Professor WYVILLE THOMSON, Queen's College, Belfast.

PROF
THOMSON
ON
PRODUCTS
OF
SHOOTING.

A MASS of miscellaneous articles is crowded into this class in the official catalogues. When the jury commenced their rounds they soon found it necessary, in order to ensure the full comparison of particular products, to negotiate with the juries of other classes of the group for the transfer and redistribution of some of these. Thus the greater part of the oils and gums, including india rubber and gutta percha, were already arranged, in Class 44, as pharmaceutical products. In this class crude oils and gums were almost invariably exhibited as part of a series showing the various stages of preparation or manufacture, and it was only in a very few cases, where the material was shown in its crude state, that it had been referred to Class 42. To ensure, therefore, general comparison, an arrangement was made with the jury of Class 44 to transfer to it all the oils and gums included under Class 42. In like manner honey, preserved fruits, and mushrooms were handed over to the food juries, while a quantity of skins and furs, which had got mixed in the catalogues under Class 46 with hides and leather, were sought out and transferred to Class 42.

After all this arrangement had been concluded the jury of Class 42 retained in their department furs and skins, furs used by hatters, hair and bristles, feathers and down, ostrich feathers, collections of objects of natural history, coral, tortoiseshell, pearl shells, teeth and horns, sponges, imitations of whalebone, and isinglass.

Although many of these products are not capable of being rendered very attractive as objects for exhibition, there are in Class 42 upwards of 750 exhibitors; and some of the collections are of the very highest interest in a scientific as well as in an economic point of view. Perhaps the most interesting and instructive collection in the class is that of the French colonies—New Caledonia, Guadaloupe, Gaboon, &c. The raw industrial products of these little-known regions are shown in every variety and quality, admirably prepared and mounted; and the natural history collections, which will be noticed hereafter, are well preserved, and are of the highest scientific interest.

PROF.
THOMSON
ON
PRODUCTS
OF
SHOOTING,
&c.

FURS.
TO
SHOOTING

The fur trade is by far the most important commerce falling into this category. As several distinct industries are included under this general head, the jury in their report found it convenient to distinguish into different groups dealers in skins and manufactured furs in the ordinary sense; preparers and dressers of Astracan lamb-skin, sealskin, and such furs as are subjected to special processes, and preparers and dyers of sheepskins.

It is not surprising that, notwithstanding their great beauty, furs are not well represented in the Exhibition. The cause of this is probably that the finer furs have a definite quality and value almost as well known as that of current coin, and that therefore they are scarcely suitable articles for competition. Besides this, their value is very great, and they are, probably more than almost anything else, liable to injury from carriage and from long exposure. The French collection of furs is accordingly infinitely superior to that of any other country. A small court in the French department is devoted wholly to them, and the leading Parisian furriers have contributed cloaks, robes, muffs, and boas of the utmost luxury and beauty. It is impossible to institute any fair comparison between the exhibitions of such houses as Revillon Père et Fils, Lhuillier et Grebert, Stanislas Revillon, Detmar, &c. The quality of fur is the same in all, and in all great taste is shown in the selection of the furs and in the style and finish of the various garments. M. Pfeiffer-Brunet, of Paris, has a specialty in shakos and ornaments of fur for the French army, and many of his productions are extremely handsome. A wonderful grebe mantle, suggestive of much weary and scarcely profitable labour, is shown by M. Detmar, of Paris. Each single feather is sewn in separately on a basis of silk, and the darker feathers are run into a graceful wreath of leaves round the skirt. One of the most interesting novelties, or rather revivals, for the plan was in use many years ago, and has only been reproduced during the last couple of years, is the *galonnement*, or lacing of furs. Some of the finest and most expensive furs, especially those from northern regions, such as the sable and the silver fox, are almost too close and heavy in the original state of the skin. These are cut up into fine strips about a third of an inch in width, and between two of these is inserted a strip of equal width of silk. To do this the strips must be most carefully matched in colour, and combined with artistic dexterity. When the lacing is completed the fur entirely closes over the silk, and it is only by blowing the fur and

separating the hairs that one can detect that the fur is not continuous. A fabric is thus produced more open and much lighter than the original skin, and a single pelt is made to cover double the original extent, giving the effect of one much larger. Such articles as tippetts and muffs produced in this way are cheaper, as well as more porous and more wholesome for wear in temperate climates, than if the skins had been used entire. The *galonnement* of the rarer furs is much in use in the Paris houses.

At the entrance of the French fur court there is a splendid case of skins exhibited by M. Servant, the leading agent in Paris for the importation of furs. This collection embraces upwards of 300 varieties of fur used in commerce.

The furs next in importance are in the Russian department. Fine collections of northern furs, including magnificent examples of sable and ermine, are exhibited by M. Belkine and M. Schraplau, of Moscow. M. Bergström and M. Forsell, in the Swedish, and M. Rustad, in the Norwegian department, show fine series of the furs of Northern Europe. The furs of the New World are poorly represented. Messrs. Günther and Son, an important New York house, show a series much inferior to what might have been expected; and the great fur trade of Canada is very inadequately represented by M. O. Côté, of Quebec. Neither is there a good collection of the furs of Australia. A few pretty articles in dark opossum skin are shown by Mr. Gardner, of Melbourne; and the New South Wales Exhibition Commission exhibit a case of the manufactured skins of the platypus, owing to the rarity of the animal a matter of curiosity rather than of commercial value.

The great London fur houses do not exhibit.

As preparers and dressers of furs Messrs. Pasquier, of Poitiers, M. Laborde-Bois, Arudy, Basses-Pyrénées, who show beautifully dressed lamb skins; Messrs. Keller and Son, Weissenfels, who exhibit dressed squirrel skins, &c., and Messrs. Quelle, Paris, take high places. Messrs. Bevington and Morris, of Cannon Street, London, stand first in dressing angora rugs, and in the beautiful art of dyeing and preparing sheepskin mats. Their work is wonderfully delicate and rich in colouring. They are rivalled by Messrs. Deed and Son, Oxford Street, and Messrs. Kibits and Son, Pilsen, Bohemia.

The purveyors of fur for hatters exhibit long ranges of small puffy masses of all soft colours,—fawns, browns, greys—even pale rose and white, the colour usually shading

Fur for
hatters.

PROF.
THOMSON
ON
PRODUCTS
OF
SHOOTING,
&c.
—

down softly towards the edges of the ball from a central darker line. These are the fleeces of rabbits and hares. The ends of the long coarse hairs have been cut off; the under layer of fine wool has been carefully dressed, and sometimes dyed by the application of mercury or some other agent during the process; and the fleece thus prepared has been shorn cleanly from the skin and rolled up. To the dextrous shearer of these small fleeces the surface of a hare or rabbit is mapped out into important anatomical regions. A dorsal band about $2\frac{1}{2}$ in. wide, stretching from the nape of the neck to the root of the tail, fetches the highest price in the market; and the value gradually diminishes up upon the head and round by the flanks towards the ventral region. Any intermediate shade of value may be had by a graduated mixture of the wool from different parts. Up to the beginning of the present century hatters prepared the materials of their manufacture from the crude skins on their own premises. About the year 1826, owing to the steadily increasing demand, the process of cutting and preparing the fleeces for making the felt was separated into a distinct trade. The invention of silk hats about the year 1830 gave a temporary check to the new industry, but a prohibitory duty on the exportation of hatters' materials out of France which had previously existed was done away with in 1847; and this, with the increasing demand for "wide-awakes," saved it. The number of rabbit and hare skins used by the French cutters has increased enormously. From the year 1830 to 1837 it averaged 1,000,000 skins a year; from 1837 to 1848, 2,500,000 a year; and in 1864 70,000,000 skins were used; in aggregate value upwards of 1,000,000*l.* sterling.

M. de Clermont exhibits a beautiful series of all the kinds of hair employed in the trade, including that of the beaver, which is fast falling into disuse; and the collection of M. Aschermann, who has aided greatly in perfecting the processes of manipulation and in developing the industry, is well worth careful inspection. Both of these collections are in the French Court.

Pigs'
bristles.

Pigs' bristles are certainly not very attractive, and thus are rarely brought before the public in their crude condition. One must remember the prodigious and unceasing demand of brushmakers and shoemakers to estimate their enormous importance as an article of commerce. This demand is chiefly supplied from Russia and the north-eastern regions of Europe. The value of the bristles imported annually into France from Russia and Germany may be

stated at about 3,400,000*f*. In the Russian Court, accordingly, we have the finest collections in this department; and Messrs. Mamontoff and Co., of Moscow, exhibit a case which thoroughly vindicates the importance of their trade; while M. Giline of the government of Vologda, and M. Bobarikine of Pskov, show collections scarcely inferior. Hair, baked and prepared for the upholsterer, is exhibited by M. Rigaud and MM. Loyer et Bernus, of Paris; and in the Belgian Court by Messrs. van de Castele and Duban, of Ghent.

PROF.
THOMSON
ON
PRODUCTS
OF
SHOOTING,
&c.

Feathers and down are chiefly imported into France and Western Europe from the west of Russia, Poland, and Southern Germany, and from Denmark, Sweden, and the north. In quality they vary extremely, from 1*s*. 6*d*. to 20*s*. a pound. A fine series, embracing most of the varieties in commerce, is shown by M. Perilis Pollak, of Prague. In the Dutch department Messrs. Klütgen of Rotterdam and Kratzenstein of Amsterdam exhibit likewise excellent collections. MM. Sieurac show in the French Court some samples which are highly recommended on account of the superiority of their method of preparation. Some of the best specimens of eiderdown are exhibited by M. Hans A. Clausen of Copenhagen.

Feathers
and down.

The finest collection of ostrich feathers is among the products of the Cape of Good Hope. Those exhibited by Mr. Benjamin, Mr. Kureller, and Mr. Bensusan can scarcely be surpassed in size and richness and in the perfection of the plumes. A good set is likewise shown by M. Marchellier from Senegal. The feathers exhibited in the Algerian Court by M. Chagot are specially interesting. They are supplied to him by M. Hardy the director of the Algerine "Jardin d'Acclimatation." They are, as yet, generally of smaller size and scarcely so full in the feather as the plumes of wild birds from the Cape.

Ostrich
feathers.

Collections of specimens in natural history are numerous, but generally not of the highest class. For convenience of comparison the exhibitors were separated by the jury into two groups—naturalist collectors and taxidermists. The most interesting and important exhibitors in the first group, those from the French colonies, have been already alluded to. M. Vieillard exhibits a skilfully mounted and carefully arranged herbarium from the island of New Caledonia. This collection was the labour of many years; it contains about 9,000 specimens, many of which are unique, and a large proportion of great rarity. This herbarium is a very important addition to the knowledge

Natural
history
specimens.

PROF.
THOMSON
ON
PRODUCTS
OF
SHOOTING,
&c.
—

of geographical botany. M. Touchard shows important collections from the Gaboon settlement, and M. Schramm exhibits a very rich and admirably preserved series of crustacea from Guadaloupe. In the Ottoman Court there is an extremely interesting collection of the insects of Syria, chiefly the Coleoptera. This collection is exhibited by Abdullah Bey, a gentleman who is very well known in the various entomological societies of Europe under another name as an accomplished entomologist and insect anatomist. There is a pretty little collection of mosses from the Pyrenees shown by M. Fourcade. M. Fourcade's collections are for sale at a very moderate price, and as the specimens are accurately named and their localities most carefully cited, they may be of value to British collectors to assist in the identification of species.

At the head of the collections of the taxidermists, M. Verreaux, 9, Place Royale, Paris, has probably the most extensive connexion and the largest business of any one in the trade; with correspondents in all parts of the world, it is usually from his emporium that rare and new forms, especially among the higher groups, mammalia and birds, first find their way into the market. In the present Exhibition M. Verreaux shows a few samples of stuffing which are scarcely worthy of his world-wide reputation.

In the Nova Scotia Court there is a very beautiful little collection of birds stuffed by an amateur, Mr. Downs. These birds are nearly perfect in their way; perhaps there is a little too much stillness and sameness in the attitudes, but the form and the proportions of the body are perfectly preserved, and there is scarcely a feather out of place.

Mr. Edwin Ward, London, stuffed and mounted the most popular group in this department in the Exhibition, the lion and tiger fighting, exhibited by Mr. Clement Smith in the Indian Court. The composition is a very difficult one and wonderfully well carried out; to have avoided a certain woodiness about the legs and paws, and to have made the group look quite natural, would have probably been impossible. Mr. Henry Ward of Vere Street shows a brilliant case of trogons. The gorgeous colours of *calurus resplendens* are well harmonised and contrasted with foliage, but the effect is spoiled by the impossible attitudes in which plump trogons are balanced on bent fern leaves and other insufficient supports.

M. Cailliaux, of Nantes, shows a very interesting collection of sections, taken in all directions through the shells of mollusca. The sections are cleanly made and very instruc-

tive. In the same collection there is also a singular series of specimens illustrating M. Cailliaux's researches into the method by which some of the boring mollusca, especially the *Pholades*, bore their chambers in every kind of hard rock. M. Cailliaux believes that this is done by mechanical action only, and his collection contains many chambers completed or in process of excavation, which he has succeeded in producing artificially by the rotation of the shells of *Pholas* and the wearing away of the substance of the rock by their rough surfaces used as a file.

Captain Mitchell, of Madras, exhibits a collection of stuffed fishes, extremely well mounted; most of the difficulties in preparing fishes in the dry way are overcome in this series. The form, at all events, is almost perfectly preserved. From the Museum of Sydney there is a large collection of the marsupial and monotreme mammalia of the colony, fairly stuffed; and an excellent collection of the South Australian amphibia. Altogether, when we consider the brilliancy of the objects and the amount of skill which may be displayed in their mounting and grouping, whether as scientific collections or for purposes of decoration, the show of preserved animals, and particularly of stuffed birds, in the Exhibition is extremely poor.

Most of the coral is exhibited, more or less manufactured, in the jewellery class; and there are only a few specimens in the crude state in Class 42. In the Algerine Court M. Laonaire and M. Onetto exhibit beautiful branches of pink and red coral; and a fine piece of rough coral, also from the coast of Algeria, is shown by Signor Avellino, of Leghorn.

Coral, pearl shells, and sponges.

A few examples of unmanufactured tortoiseshell and some pearl shells are exhibited by M. Hort, from Tahiti.

The only important collection of sponges is in the French department. MM. Coulombel et Devismes, Rue du Faubourg St. Denis, Paris, show a fine series, embracing almost all the varieties used in commerce. There are beautiful specimens of the most valuable variety from the coast of Syria, and many fine examples of the coarser and cheaper kinds from the Bahamas, &c. But the ornaments of MM. Coulombel's case are some gracefully-formed old Phœnician amphoræ, which have been dredged up incrustated with the finest sponges, whose soft fair masses contrast wonderfully with the dark antique pottery. There are also in the collection vases of sponges, in spirit of wine, in the state in which they are recovered from the sea, covered and filled with the original crust of animal matter. The collec-

PROF.
THOMSON
ON
PRODUCTS
OF
SHOOTING,
&c.
—

tion is very artistically arranged and highly interesting in every point of view. M. Haymann likewise exhibits a vast collection of sponges, chiefly of the cheaper varieties. In the collection of M. Rennes there is an example of the rare Venus flower-basket (*Euplectella aspergillum*), a beautifully formed sponge, consisting entirely of glass-like silicious threads, which has lately been brought in considerable numbers from the Philippine Islands. In the Turkish Court there is a small but interesting collection of fine sponges attached to stones, showing their mode of growth. There are a few from Greece, exhibited by the commune of Pyrgos; and the committee of the Bahamas show a considerable series of the inferior variety which forms so important an article of commerce in these islands.

Crude
isinglass.

Excellent samples of crude isinglass are shown from Russia, Brazil, and Guiana.

Imitation
whalebone.

There are two attempts in the Exhibition to imitate whalebone. The gradual extirpation of the Greenland whale and the great consequent increase in the price of true whalebone give any satisfactory step in this direction a great commercial importance.

Messrs. Aubly and Co., Paris, show an apparently excellent imitation in buffalo's horn. From the close similarity in the structure of the two substances there seems to be no reason why this substitute should not answer most of the purposes to which whalebone is now applied. The horns, after undergoing some process, are cut into strips, which are compressed and straightened. Horns of different sizes and different parts of the horn cut of course into pieces of different length; and a great deal of waste is saved by supplying dressmakers with packets of the prepared horn of every possible length, width, and strength, suited to every purpose of their art.

An imitation of whalebone in compressed cane, exhibited by Messrs. Schwartz and Son, of Copenhagen, is much cheaper, but otherwise not so promising; it will probably be applicable to inferior purposes only.

REPORT on SPUN and WOVEN FABRICS, shown as specimens of DYEING, BLEACHING, or PRINTING.—(Class 45.)—
By Professor BOLLEY, of ZURICH.

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

WE shall limit ourselves at first to a review of the general characteristics of the goods at present in the Exhibition, and particularise only what is new.

A statistical account of the part taken by the different countries according to the general catalogue would be of little worth, as a confused arrangement of the official classification (see introduction to Class 27 of the general catalogue, France) induced some commissioners to place products which evidently belonged to Class 45 in the Classes 27, 28, 29, 30, 31,—cotton, wool, silk, mixed fabrics.

The most prominent place in our class is occupied by France. France, as well for the number of exhibitors as for the excellency of the products.

As the most attractive class of goods of the French exhibition, we call attention: 1st. To the worsted and woollen goods from the neighbourhood of Paris, which are of surpassing richness and variety of colours, especially merinos. 2nd. Printed silks, worsted, mixed silk and woollen fabrics, *poile de chèvre* (alpaca), some from Paris, some from Lyons. 3rd. The cotton and woollen prints from the department of the Upper Rhine (Mülhousen).

The specialties called *hautes nouveautés* are especially represented in dresses, shawls, and furniture stuffs. In the silk fabrics we find combinations of warp-printing and weaving which affords as brilliant a proof of the good taste as of the technical power of invention of the manufacturer. The warp-printing does not exhibit that indistinct appearance which it formerly did; but, on the contrary, the design stands sharp out, so that the printed part is treated by the weaver as satin. The effect is sometimes heightened and varied by the cutting of the satin, by which a velvet-like appearance is obtained. See, for instance, in the Exhibition of the Chamber of Commerce of Lyons the goods from Ronce and Vachon; and the exhibition of Brunet, Lecomte, and Co., and also the one of Bourgoin (Isère).

In the exhibition from Mülhousen we observe three styles (genres) in point of novelty, taste, and design. Mülhousen
Exhibition.

1st. The furniture prints partly are a deceptive imitation of the antique furniture called *terres*, which we do not think it necessary to dwell upon. But there is presented a new and

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

surprising style of room decorations. They are produced upon a very coarse cotton stuff—the so-called *cretonne*. The ground is printed blue or pink, and the white left out for the design. The simplest example we can cite is that of two greys, and the natural white of the stuff, or three greys and black, besides the white of the ground, are used for the design. The effect is surprising. Let us cite, amongst others, the exhibition of Mr. Fries-Reber, from Ringersheim (Upper Rhine), and of Mr. Thierry-Mieg, at Mülhausen, which establishment has obtained great praise for having invented this style.

2nd. The imitation of Cashmere shawls by printing has reached the highest perfection. The materials are fine worsted goods or mixed fabrics of wool and silk. The palm-leaf pattern is executed with wonderful precision, and in the richest and most delicate combinations of colours. The house of Steinbach Koechlin, Mülhausen, is distinguished in this article; they exhibit merinos—robes of which the bottoms of the skirts consist of patterns borrowed from the Cashmere shawl, while the upper part is of one colour, blue or green. The execution of the one-coloured as well of the figured part is uncommonly beautiful.

3rd. A great number of the print manufacturers of Alsace contribute to the third style, which consist in piquées, shirtings, jaconets, muslins, barèges, and other cotton and worsted materials for ladies' wear; shirts for gentlemen, &c. In most cases the ground is white, but sometimes of a nankin yellow, or other fashionable colour. They are somewhat in the madder style, or albumin and lacterine print, with new colours or ultramarine. The designs represent partly large bouquets with garlands, partly small single flowers, or one-coloured, generally black, small and single arabesques, drawn upon a ground of the purest white or of a pale tint, with a distinctness and a freshness we have never seen attained. The designs are extremely correct—in many cases, exact copies of nature; every pattern harmonious and free from exaggeration.

Mülhausen again proves that it is not to be surpassed in this department. We take the liberty of omitting the enumeration of the contributing firms, well known in the industrial world, and of which a complete list is to be found in the general catalogue.

Rouen furnishes its well-known staple articles, most of them madder; also indigo-resist, discharged Turkey red styles.

It is much to be regretted that Great Britain is almost entirely unrepresented in this class, as her superiority in those

Great
Britain
almost un-
represented.

styles is acknowledged. One finds, however, many things worthy of notice in dyed silks, dyed cotton yarns and twists, dyed woollen yarns, prints on cotton and combed wool, &c. But neither Spitalfields, Coventry, Manchester, Glasgow, Bradford, nor any of the other principal industrial districts in which dyeing and printing flourish, have come forward with their superior strength.

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

Switzerland, with the exception of France, stands foremost in the variety of her fabrics and the number of her exhibitors. All that she furnishes are articles of general use, with the exception of a few which may be reckoned amongst the *hautes nouveautés*, Turkey red yarns and cotton fabrics asserting their old claim, discharged Turkey reds, steam colours, madder style for handkerchiefs, &c.; blue ground chintz in beautiful variety (resin-resists), indigo-resists, dyed tertals in different colours, albumine prints. Besides these, exhibitions of coloured floss and sewing silks.

In the North German States, the calico prints and the dyed silk of Berlin, the dyed silk, and dyed Turkey red of the Lower Rhine, and the dyed wool of different parts of the country are fairly represented.

North
Germany.

Baden has a very fine exhibition from Lörrach.

Baden.

As to the Austrian empire, Vienna stands foremost in printed shawls; Bohemia (Prague and Cosmanos) in ordinary cotton goods; Reichenberg in printed combed wools. Besides, many things worthy of notice are to be found in the dyed silks, wool, and Turkey red.

Austria.

Russia is very creditably represented in printed cotton goods, especially of the coarser kinds suitable for national costumes, and in well-executed garancine articles, in Turkey red and also lapis.

Russia
and other
countries.

From Italy we find many things, especially Turkey red dyed goods.

Spain has a tolerable show of cotton prints, mostly stuffs for common use.

Belgium has also a very complete show of printed cotton goods, as well as of coloured sewing-thread and Turkey red yarn.

In Holland we find, as characteristic, Javanese and imitation Dutch tattiks.

We cannot pursue further our observations on other specimens of dyed or printed goods scattered in the exhibitions of the different countries.

There is much novelty to be seen in the great Exhibition on the Champ de Mars even in Class 45. In some cases it is difficult to determine whether they were invented previous to the year 1862, as at that time there existed many that

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

Mechanical
inventions
for printing
of fabrics.

were not exhibited in the International Exhibition of London.

We shall begin with a close description of some *mechanical inventions* relative to the printing of goods. The introduction written by Professor Persoz, of Paris, to Class 45 of the French official catalogue, points out the advantages which arise from the employment of cast-iron rollers covered with a sufficiently strong galvanic deposit of copper, instead of the rollers made entirely of copper as hitherto in use. This invention will necessarily diminish the capital value of the considerable stock of engraved copper rollers existing in larger prints works. It is also easy to understand that rollers of greater diameter, calculated to produce patterns of larger "rapports," can now be made with greater ease and much less expense.

There are at present innumerable patterns, as well for gentlemen's as for ladies' wear, for the manufacturing of which cotton yarns, floss silk, and worsted yarns, printed in the "chiné" style are required. Formerly such kinds of yarns were at first dyed, and at certain distances strips of lead were applied on the hanks of yarn, and then dipped into a discharging fluid, when the colour was removed on the uncovered parts and preserved on those which were covered. This method was slow, expensive, and exceedingly incomplete. More exact patterns of much smaller dimensions are now produced by warp-printing by machine, which turn out a large quantity of goods, and which is the invention of Messrs. Andrews & Co., of Manchester. For many years yarns were sent to Manchester to be printed; but at present the machine is well known on the Continent, and as far as we know, it is susceptible of printing with four colours; in fact it is a roller-printing machine. The rollers (two, three, or four) lie alongside each other horizontally, and the receptacles for the colours beneath. The yarn is kept in equal tension (wool yarns probably moistened with steam), for which there is an arrangement in the machine, which spreads it out thread by thread, as on a loom, the threads being then drawn between the rollers. For more exact patterns the warp is in some places crossed by some weft threads, which, after the printing, are drawn out. This is absolutely necessary for the chiné-style yarns. The variety of patterns which can be produced by means of such chiné-yarns is so great that the manufacture of them will be long in vogue.

Messrs. An-
drews & Co.

In the printing of shawls very considerable mechanical improvements have been made by a French and by an Austrian exhibitor. M. B. Wulverik received, on Feb. 20, 1867, a gold medal from the "Société de l'Encouragement pour

l'Industrie Nationale" of Paris for several improvements which he carried out in the working of carded wool and in the printing of shawls in the establishment at Deville, near Rouen. The most essential part of the last-named invention, upon which there is a report in the "Bulletin de la Société d'Encouragement pour l'Industrie-Nationale," by Professor Alcan, is that a block provided with colour (the design being turned upwards) is fastened on a table upon which the shawl, stretched on a frame, can be let down. This being done, a second frame, covered with oilcloth, is laid upon the first; this oilcloth is then pressed with pads ("tampons") upon the shawl underneath, so that the colour may be equally distributed on the latter; small upright pegs, fixed upon the table, and for which corresponding holes are bored in the frames, serve as regulators. Of course, several blocks can be fastened side by side on the same printing-table. The printing-block does not receive the colour by being dipped into it as in the common hand-block printing, but by means of pads (tampons) which produce the same effect as the book-printing roller. It must be allowed that a great advantage is attained by avoiding the difficult and inconvenient moving of the block.

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

M. B. Wul-
verick.

Mr. T. Bossi, of St. Veit, near Vienna, also exhibits shawls, which are accompanied by undeniable testimonials, which attest that they are not produced by hand-printing but entirely by machinery. The machine is said to be patented in Austria, but we have not been able to obtain any details as to its construction.

Mr. T. Bossi.

In the wool-printing works of Larsonnier Brothers and Chenest, at Puteaux, near Paris (technical manager, M. Blanche), there is an arrangement which greatly facilitates hand-printing on light-combed woollen and mixed stuffs.

Larsonnier
Bros. and
Chenest.

The invention of this machine is most important to the manufacturers in the neighbourhood of Paris, who are compelled to seek for some means of rendering themselves independent of the whims of their workmen, whose wages are already higher than in any other part of France. The object of this apparatus is to enable less practised printers to produce accurate work. The piece of cloth to be printed is easily glued to the table, which is nearly 22 metres long, so that when partly moistened with the colour it is easily drawn. Iron rails that can be exchanged are laid along both sides of the printing-table, conical holes are made at regular distances on one side of these, and on the other side are corresponding grooves. The holes and grooves correspond exactly with the length of the hand-blocks. A strong movable cross-rail runs over these two straight rails. The

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

end next to the conical holes is provided with strong conical pegs fitting into the holes.

When the workman has printed the whole breadth of the piece the peg of the cross-rail is put on to the next hole on one side, and on the next groove on the other. On the side of the cross-rails are incisions wider at the top, but running to a point below, thus forming an acute angle with the point turned downwards. There are two strong pegs in a horizontal direction upon the wooden block. The printer sinks one of these pegs into the incision on the cross-rail. The converging sides of the incision or angle render this easy. The other peg rests only upon a bar of iron in the cross-rail. The distance between the conical incisions on the cross-rail corresponds exactly with the width of the wooden block. The arrangement is very simple, and answers the purpose of fixing the block quickly and securely in its proper place.

In conclusion, we have to mention some arrangements known under the name of "*chassis à compartiments*." The sieve, or "*chassis à compartiments*," has existed for some time, but presenting very different details. We have been favoured with a complete and detailed description, and with the personal inspection of two such apparatus. One of them is worked at Larsonnier Brothers, of Chenest, near Puteaux. It is applied to the Perrotine. The latter machine is, as already known, arranged only for four colours, whereas the "*chassis à compartiments*" allows the printing of twenty colours at the same time. It is the simplest and surest way to apply the "*chassis à compartiments*," that is to say, to the sieve of the Perrotine, the movement of which is horizontal. The thickened colours are put into small compartments, which are placed in corresponding holes in a strong piece of wood. The taking out of the colours is accomplished by means of copper pegs, which, being in a direction corresponding to that of the compartments, can be dipped into them. These pegs transfer the colours to a board upon which a number of pieces of felt or thick cloth corresponding to the number of basins are attached. Finally, the common sieve receives the colour from these pieces of cloth, transfers it to the block, the perpendicular motion of which again transfers it to the stuff. The arrangement is simple and very ingenious, and may be worked with great precision.

Messrs.
Guillaume.

The other machine, already referred to, is to be seen at the establishment of Messrs. Guillaume (father and son), at St. Denis. It is principally intended for hand-printing, but is said to be also capable of being applied to the Perrotine.

The colours are also placed in pewter dishes or compartments, which can be pressed against a frame, in which there

are a corresponding number of holes. Stamps are hung through the holes, so that by the rising of the colour-compartments they dip into the colours. The horizontal, and afterwards perpendicular, movement of the stamp frame transfers the colour to the sieve. There is a piece of oil-cloth stretched on a wooden frame, on which again pieces of felt of the same number of colour stamps are fastened. The block receives the colour from this sieve in the usual manner.

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

These apparatuses will render most important service, especially in steam colours, particularly for wool and silk fabrics, when the designs are small and of many colours.

There are also in Class 45 many improvements which are based on the chemistry of this subject. We shall begin with the dyeing. Dyeing.

It is well known that the usual process of Turkey red dyeing is pretty much the same everywhere—in Scotland and Lancashire, as well as in Germany, Russia, France, and Switzerland—and that it consists in a number of empirical operations, which are not capable of being scientifically explained, and which require much time. It may be said that cotton requires a whole month of chemical operations before it is ready. As yet only the important establishments of Messrs. Steiner, at Accrington and Ribeaupilles, have become masters of a simplified method. Not only do these two houses produce the Adrianople red in a much shorter time, but it is the most fiery one produced. Messrs.
Steiner's
process.

In the French compartment of the Exhibition are to be found, in the department allotted to the articles from Rouen, Turkey red stuffs from M. Alph. Cordier, of Bapaume, near Rouen, which, although surpassed it is true in beauty and intensity of colour by many productions of the same kind, are nevertheless worthy of notice. M. Cordier.

M. Cordier informed the jurors of the class that these goods were made ready in five days; and, as a proof of the veracity of his statement, he proposed to return within that space of time unbleached cotton cloths, which should be marked in whatever way the jurors chose. Several pieces of calico, with a characteristic mark, were sent to him from Paris, and on the sixth day they were returned to the jurors and found to be exactly like those exhibited.

We remark that the dyed stuffs of M. A. Cordier do not betray the least sign of oil either in the smell or by the pressing between blotting-paper. Finally, it is to be observed that this red is capable of being discharged.

The exhibition of Chalamett Frères, of Puteaux, near Paris, may be regarded as an instructive curiosity. They

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

Chalamett
Frères.

show two large parallel rows of dyed merinos—the one dyed in colours formerly in use, the other row exclusively dyed with modern tar colours.

An impartial comparison is by no means to the disadvantage of the old colours. That the sharp penetrating tints of the fuchsine, aniline violet, or blue cannot be produced by the old processes is well known; but crimson scarlet, and many fashionable colours that are much liked in such combed-wool fabrics, are not to be attained by modern colours. The old and new green are pretty much the same. Light blue is somewhat dull in the new tar colours. Amongst the new colours is also coralline, which, when *fixed* by chloride of tin, is said to be a pretty *fast colour*.

Messrs. Guillaume (father and son) have in their fine collection of fabrics also specimens of a pomegranate-blossom colour, composed of fustic lake and fuchsine, instead of orchil, as was formerly the case, and which is said to possess important economical advantages. This new pomegranate-blossom red may, like the former kind of reds, be easily modified in different shades by means of indigo-carmines. The exhibited proofs are vivid and clear.

Messrs.
Hulot and
Berruyer.

The large silk and yarn dyeworks of Messrs. Hulot and Berruyer, of Puteaux, near Paris, exhibit silk, floss silk, wool, and cotton yarns in the most varied colours; also mixed yarns, which in equality of tint leave nothing to wish for. This collection is particularly interesting, as showing the application of some new colouring materials derived from tar. These are the newly discovered derivatives of aniline and toluidine due to the talented chemists Girard and Delaire. It is well known that the best process for producing fuchsine with arsenic acid and the discovery of aniline blue is due to those chemists.

The new colouring materials employed by Messrs. Hulot and Berruyer are:—1st. Manseaniline, one of the colouring substances found in the refuse of the preparation of fuchsine, but which may also be produced by a particular process. 2nd. Violet of manseaniline, produced by the working of iodide of methyle, or iodide of ethyle upon manseaniline. A combination of ethylmanseaniline or methylmanseaniline results, which produce a very beautiful violet. 3rd. Different colours produced from diphenylamine or from the phenyl-totuyllamine by the action of sesquichloride of carbon. A combination of the latter with a mixture of diphenylamine and diphenylolindine produces blue; diphenylolindine alone produces maroon (chestnut colour). Diphenylamine alone, a greyish blue violet. It seems by these discoveries that a great field is open for the producing of new shades of colours.

4th. Yellow from chrysotuidine, also a substance found in the refuse of the production of fuchsine.

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

It seems particularly worthy of our notice that discord has arising among dyers concerning the bad practice of adding weight in the dyeing of black silk by all sorts of artifices. Thus from 50 to 70 per cent. above the original weight of the silk is very common, and an augmentation of the weight up to 100 per cent. not unfrequently occurs, so that the consumer has only half the quantity of silk he thinks he has, and to which he is entitled.

M. Gillet-Pierron, owner of two dyeworks, at Lyons and the other at St. Chamond sur Gier, and in which there are yearly about 300,000 kilograms of silk dyed black, has presented the jurors with a pamphlet containing the results of his examination of the various processes to which silk is submitted when dyed black. There is nothing very new in it, but some questions are cleverly treated, and there are some results which are of the greatest importance in a practical point of view.

M. Gillet-
Pierron.

We shall now give a short historical sketch of the newer methods of dyeing black silk without referring to the old ones or those used in Asia.

Black silk-
dyeing.

Instead of commencing the operation as formerly, by impregnating the cloth with a solution containing tannin, and then dipping it into the solution of a salt of iron, Gonin, in the year 1824, reversed the process, by first giving the iron-mordant with sulphate of iron, and then dyeing with logwood and fustic. Finally, he added another operation, a "bath" of campeche, mixed with soap. This black was called Lyons black, and sometimes English black.

The dyeing in Prussian blue was introduced in 1833. It preceded the black dye. The shading was good, and the silk heavier than with the old methods. In the year 1847 catechu was introduced in black dyeing at Lyons, instead of the extract of the chesnut bark or nut galls. It is believed that this mode of producing black was known in Germany, as well as in England, previously to that period. This black was called "mineral black." The whole process consisted, first, in giving a Prussian blue ground, then an iron mordant, and on this a catechu solution; and lastly a solution of logwood and soap. The black was of great brilliancy, and the silk, which retained its natural elasticity, was soft to the touch and the tissues were solid and durable. This method, says M. Gillet, ought never to have been given up.

In the year 1854 the Arabian henna (alcanna) was introduced as a substance containing tannic acid, instead of catechu, and soon afterwards both were used to produce

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

Bakhaus'
invention.

Classes of
black dyes.

the so-called "noir d'Afrique." This black is of peculiar brilliancy, and very popular among silk manufacturers. In 1859 it was supplanted by the finer and deeper "noir Imperial," the production of which is still imperfectly known. In the same year another method, invented in Crefeld by a silk-dyer (Bakhaus), and for a long time kept secret by him, was brought over to Lyons by a Russian silk-dyer. It consists in employing salts of tin, which are added to the catechu "bath." This method was adopted at the same time in England, France, and Switzerland, and has ever since remained the basis of the production of the heavily weighted black-dyed silk. At first the increased weight of the silk was 20 per cent. Afterwards the dyer proceeded to 30, 40, 50, and even to 100 per cent. by repeating the impregnation with the above-mentioned substances.

The different blacks on boiled silk may be divided in the following manner:—

1. Fine black (20 per cent. loss), especially used in the manufacture of velvet and for the finest fabrics. It is obtained by the use of several colour-solutions of fustic, weld, and quercitron-bark, which are preceded by a weak solution of acetate and nitrate of iron. When the iron mordant is not given first, a little sulphate of iron and copper is added to to the dye-beck. A "bath" of logwood and soap is always the last operation. With this class of blacks the silk retains its entire brilliancy and softness.

2. The 100 per cent. black, also called noir Imperial.—In this case the thread is much more weighted than in 1. The silk is first dyed in Prussian blue, then passed through a decoction of nutgalls, and lastly worked in a beck containing a solution of logwood and soap. Besides these, acids and colouring substances are employed, but they are not mentioned by the author.

3. Heavy black on raw silk.—This is produced by an iron mordant, fixed on the silk by a solution of boiling soap. These operations are repeated according to the amount and increase of weight intended to be given. It is then blued by means of yellow prussiate of potash; and lastly passed through a solution of perchloride of tin, which operation may also be repeated. A solution of pyrolignite of iron is also used to preserve the bluish tint, which otherwise would disappear when the silk is finally passed into "baths" of catechu. In this manner blacks weighted from 20 to 100 per cent. are obtained.

4. Souple.—The following peculiar mode of dyeing is very frequently used for weft. At the dye works of St. Chamond the iron mordant is first applied, washed out, and fixed with

a weak solution of soda; these operations are repeated according to the weight that is to be given to the silk. An acidulated solution of yellow prussiate of potash is employed to make it blue. But this blue is only precipitated on the gum (or glue) of the silk, and does not penetrate through it. In these operations the silk retains quite the touch of raw silk. It is made souple by a hot tannic acid solution, for which catechu, nutgall, dividivi, &c., are used. Perchloride of tin is put into the catechu baths or not, according to the desired weight or shade of colour; finally, a soap solution is used.

Effect of
dyeing in
bulk and
weight
silk.

In M. Gillet's dye works the following averages of the various classes of blacks are dyed;—black Nos. 1 and 2, 35 per cent.; of the common heavy black, 35 per cent.; of the very heavy black, 10 per cent.; and noir souple, 20 per cent.

M. Gillet found that the increase of the boiled silk with the heavy black was about as great in bulk as in weight; therefore, in a silk tissue with an increase of 100 per cent. of the weight, only half of the space is filled with real silk, the rest is colour, &c. which adheres to the outside, only a small part of the colour having penetrated into the fibre. He found, also, that the individual threads of a very heavily weighted raw silk, especially during the latter operations, had become widely separated, and that only the gum of the silk had taken the colour, the silk itself being but slightly coloured. It cannot be disputed that this swelling and separating of the threads of the raw silk in their single cocoon threads must injure its strength.

This result agrees with the experiments, thus silk is found much stronger in the serimeter than after it has been dyed heavy black.

A most interesting observation, which exactly coincides with what we have stated, has been made in the "Etablissement pour la Condition des Soies," at Paris, conducted by Professor Persoz. Silk dyed "heavy black" was handed over to this conditioning house. It was heated like raw silk, and on taking it out of the drying apparatus, it had become a partially pulverized mass, partly black, partly brown, from iron mordant.

Cannot what was here produced by heat be gradually effected by wear? This is most probable. We have, therefore, when we purchase heavy-dyed silk stuffs, not only much less silk than we think, but silk which has lost its principal property, namely, strength.

As a conclusion to our report on dyeing, we must mention the great perfection which has been attained in the dyeing of woven silk stuffs by Messrs. Petitdidier, of Paris, who

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

Messrs.
Petitdidier.
Improve-
ments in
printing of
fabrics.

Mr. E.
Kopp's
method.

have great success in this class of work, as well as in the cleansing of worn clothes (see below). The red dyeing, finishing, and watering fabrics are carried out by the same firm in the most careful manner.

In the printing of fabrics there are many new and also important improvements. Amongst the foremost is the application of madder extracts by printing direct on entirely unprepared stuffs instead of the method hitherto in use of dyeing with madder, garancine, pincoffine, or the flower of madder. In the Exhibition three different extracts have been employed. Mons. Scheurer and Rolt, of Thaun (Departement Du Haut Rhin), exhibit a great number of specimens in violet, pink, and red, most of which are intended for general use. Wherever there are large surfaces of colour the tint of colour is very uniform. The red and pink are clear, the violet well saturated, and without the least tinge of red. All these results have been obtained with "green alizarine," which has been produced by a method due to Mr. E. Kopp, and which is carried out at the works of Mr. Schaaf and Lauth of Strasburg. The most essential details of the process are the following:—

Madder is steeped in ten parts of water, containing sulphurous acid, to which is added one-thousandth of hydrochloric acid to saturate the chalk which madder contains. The whole is left together for from 12 to 24 hours, but must be stirred at intervals. The fluid is separated by transcolation on a piece of fine woollen cloth and squeezed out, the remaining madder being subjected to a second similar process. Both fluids are put together, and three to four per cent. of strong hydrochloric acid is added to them, which occasions a flocky orange coloured sediment, (this takes place quicker when they are heated to 50 deg., or at most 60 deg.,) and is collected and washed till the fluid is quite free from acid. This sediment is a mixture of different colouring matters, which resemble the purpurine of chemists, and Mr. Kopp has also called it purpurine. If the fluid which has run from the purpurine is boiled, flakes are again formed, consisting of alizarine, humic acid, and resin, which has been called by the inventor of the process "alizarine verte." The greenish substances adherent to the red colour, when applied to printing and dyeing, have no effect. It must be observed that by this method the *alizarine is separated from the purpurine.*

M. Schum-
berger, Son,
and Co.

Other Mülhousen manufacturers—for instance, M. Schumberger, Son, and Co.—have exhibited some cotton fabrics, intended for common wear, or for furniture, which have been produced by the simple process of printing with a madder

extract. The red parts in the latter style are often very large, and the clearness and intensity of the colour is all that can be desired. Further, an observation has been made in this establishment which is in favour of this process—namely, that by it the so-called dead cotton (cotton mort) can be dyed, whilst it remains white in the ordinary mode of producing “garancine styles.”

The extract made use of by Messrs. Schumberger is that of Mr. Pernot. The process of its production is a mere mechanical one, and does not *admit of the separation of alizarine and purpurine, therefore they are mixed together.* According to the patent obtained by Mr. J. Pernot in Great Britain, he adopts the following method:—The madder roots are first carefully freed from earth and such like by washing; they are then finely ground in a small quantity of water, during which all contact with chalk, copper, and iron should be carefully avoided. The pulp which is thus produced is placed into a wire sieve, the holes of which are such that the particles of wood remain, while the pulp containing the colour passes through. The woody substance that remains is then washed, first with cold water entirely free from chalk, and afterwards with boiling water, till the water which runs from it is no longer coloured. The water which has been used for washing is allowed to cool, and is then mixed with chloride of calcium, by which an insoluble sediment is obtained, said to easily combine by heat with mordants. This sediment is collected upon a woollen cloth, in order to strain off the water, then pressed, dried, and pulverized. In the description of the patent there are some very unintelligible passages relative to the production of alizarine. It is said that in the production of alizarine, hydrochloric or sulphuric acid, or some other substance forming an insoluble combination with the colouring substance, (?) should be mixed with the fluid strained from the wood particles.

Mr. Pernot's
process.

Further, it is said that the pulpy precipitate produced by chloride of calcium can be employed in printing in its damp state, but when used in the production of alizarine, it must be pressed and dried. But how this object is attained is not indicated, nor is alizarine made on Pernot's method a commercial article.

There is in the Austrian department another exhibit in which the use of extracts is substituted for garancine in the production of that style of print goods. The extracts have been prepared after the method of Professor Rochleder, of Prague, and the goods are exhibited by F. Leitenberger, of Cosmonos, Bohemia. We do not know the particulars of this process. The whole of their products are very good;

Austrian
exhibitors.

Professor
Rochleder
method.

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

the violet seems to us to have a tinge of red, but the red is full and bright. These gentlemen however employ also the dyeing process for several of their patterns, but use in it the extracts of Rochleder, instead of garancines or flowers of madder, &c., which are usually employed. We have not sufficiently accurate information on the methods of application of those different extracts to justify us in publishing them.

A fourth extract of madder is mentioned, namely, that of Messrs. Messonier, exhibited in Class 44, among the chemical products, but which we do not find at all applied in Class 45. We cannot therefore report upon it. The method of production of this extract is also unknown to us.

When we compare the length of time and amount of trouble required by the processes hitherto in use of producing the so-called madder or garancine styles, with the new method, which consists in nothing but simply printing upon entirely unprepared cloth, we cannot but admit that we are on the eve of a complete reformation in the production of the numerous and beautiful class of goods.

Thus until now--1, the thickened mordant had to be printed on; 2, it had to be dried by being hung for three days up in the ageing-room; 3, an impregnation of cow-dung was given; then 4, it had to be washed; 5, it was dyed with madder or garancine, pincoffine, (commercially alizarine), or flowers of madder; 6, the goods had to be submitted to the clearing process, which is subdivided into different operations, the principal ones being acid baths and boilings in a soap solution.

If all the washings which occur between each operation and the repetition of the several processes necessary to the cleaning of goods were counted, they would amount to from fifteen to twenty.

The specimens produced by the printing of extracts leave nothing to wish for, as we have several times mentioned, particularly as regards the depth and freshness of colour; they are also fast and can bear soaping, as we have proved it with the specimens exhibited by Messrs. Scheurer-Rott.

I may add in conclusion that the whites in new methods of producing madder styles are, as already stated, extremely beautiful, which is not the case in the ordinary dyeing process, as the not mordanted ground easily takes the colours which are difficult to get rid of even by bleaching on the grass. For lilac patterns chlorine is of more use in the clearing of fabrics than in the bleaching of the grass; and it may be said that the solution of bleaching-

powder cannot be applied without danger to thin and fine tissues.

Messrs. Steinbach Koechlin, of Mülhausen, have tried the printing of very weak solutions of bleaching-powder upon the white grounds of thin fabric that cannot bear much chlorine, and this only on the backs of such goods, and have arrived at most satisfactory results.

Many very ingenious improvements are shown in the printing of silk. M. Brunet Lecomte exhibits pieces of dyed and printed silk stuffs which are produced in a most peculiar manner. The designs are small, and consist mostly of from two to four colours. These colours are mixed and, with a resist containing resin and fatty substances, printed on. After being perfectly dried the pieces are dyed, in order to give to the ground the desired tone. They are then washed, dried, and drawn through a closed box in which there is benzine or a similar hydrocarbonaceous fluid, calculated to dissolve the resin and fatty substances. The action of this reserve is only mechanical, and on being removed the colours appear. The pieces produced by the process and exhibited are very satisfactory.

It is easy to conceive that when this method is perfectly understood great advantages will have been attained in the printing of thin fabrics. It is well known that there are great difficulties attending the printing of small designs in the dark grounds of thin fabrics; while by this method the ground of the piece and the design are quite independent of each other. We call attention to the dyed warps, from which huge masses of colour are taken out by discharge, and on which the design (for instance in black), is then printed. Such articles are exhibited by Messrs. Troester and Co., of Tallien (Isère).

M. L. Chocquel, of Paris, exhibits organdies. The printed patterns are stripes of little flowers and leaves, or arabesques, which produce very little effect upon such a thin, transparent stuff. But here the effect is heightened by putting the patterns upon a thicker white stripe, introduced into warp. In this way the pattern stands out more strikingly.

Messrs. Guillaume, of St. Denis, have succeeded in producing, by printing upon mixed fabrics, as well as upon alpaca, an uniform ground in different fashionable colours. This process admits of the employment of stuffs which have not a clear white.

The same house also exhibits warp-printing in goat's hair, on which the ground colour (for instance, pale green) and the design are printed at the same time. The weft is white; by this means the pattern comes out much clearer than in the

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

Messrs.
Steinbach-
Koechlin.

M. Brunet
Lecomte's
method of
printing
their
fabrics.

M. L. Choc-
quel.

Messrs.
Guillaume.

PROFESSOR
BOLLEY
ON
SPUN AND
WOVEN
FABRICS.

former manner of printing on white warp and giving the ground colour by means of a coloured weft. There are also very pretty attempts at imitating, by printing, the present fashion of sewing beads or bugles on different articles of ladies' dress.

Various
exhibits.

Messrs. Petitdidier, of St. Denis, exhibit a great number of silk stuffs, woollen stuff, and silk ribbons, upon which are printed raised bright round spots. The colours are different, but black prevails. These manufacturers call it "stelliner." The spots are fixed by means of a composition of resin, and are not only made fast but the colour does not come off either by the warmth of the hand or by laying one piece over the other.

By way of appendix, we shall notice some products of bleaching, dressing, renewing, and restoring of worn stuffs.

The firm of Verité, Schlules, and Co., at Courbevoie (Seine), has acquired a great reputation for the bleaching of Orleans, which were formerly imported from England only in a bleached condition. They are now imported in a raw state, and the firm just mentioned bleach them for the dyers and printers in the finest manner.

The finishing methods ("apprets") employed by Mr. Cing Rupp (Boulevard Mazar, 138, Paris) present great variety, especially for gauzes, sultanes, poplins, organdies, and the different barèges; they deserve the increasing universal approbation they meet with.

S. Barlow
and Co.'s
cotton
fabrics.

The finishing of cotton fabrics, in order to give them the appearance of silk, exhibited by S. Barlow and Co., in the English department, is much approved of.

M. Petitdi-
dier's new
cleaning
process.

M. Petitdidier, whom we mentioned above in speaking of cloth-printing, has placed before the public a very interesting branch of industry.

In Paris great numbers of heavy silk dresses are embroidered. If the colours of the stuff or of the embroidered designs be light, they generally leave the hands of the women who have been employed in working on them for several months in a very dirty condition. The new method of cleaning of the above-mentioned establishment is by means of fluid hydrocarbon, which does excellent service, as is proved by the cleaned and uncleaned stuffs exhibited together. This cleansing process is also applied to worn dresses. The firm of Petitdidier has treated within the last four years about 20,000 embroidered silk dresses in this manner.

APPARATUS used in SHOOTING, FISHING TACKLE, and IMPLEMENTS used in GATHERING FRUITS OBTAINED WITHOUT CULTURE.—(Class 49.)—By MAJOR EDWARDS, R.E., and WENTWORTH L. COLE, Esq.

APPARATUS
USED IN
SHOOTING,
FISHING,
&c.

THE peculiarly elaborate classification of objects which the Imperial Commission had thought fit to adopt, and the attractive and exhaustive heading of this class, were but hardly justified in the very miscellaneous supply of exhibits which it embraced. Indeed, it is not hypercritical to assert that there were but few objects which displayed either novelty of invention, choiceness of manufacture, or such a singularity of excellence as would have attracted the general visitor.

Much allowance must be made for the fact that Class 37 has already exhausted the notice and review of the weapons and equipments belonging to the sportsman, which would otherwise have been treated of in Class 49. Shot-guns, sporting rifles, and the necessary paraphernalia, large and small, with which the sportsman is accustomed to furnish himself, are totally exempted from our present remarks, and it need not be pointed out that the absence of these articles, which include the ingenuity and talent of so many branches of manufacture, has considerably narrowed the scope of our investigations.

Limited as may have been their attractiveness, it may, however, be advisable to separate into three different sections the articles contributed by those countries which were in any way represented in this class. But it must be borne in mind that no less than 12 countries entirely failed to put in any appearance at all in this division, and that the total number of exhibitors in Class 49 does but amount to 179, which, as regards their several countries, is thus divisible:—France, 56; Belgium, 1; Austria, 5; Spain, 2; Denmark, 4; Sweden, 10; Great Britain, 6; Norway, 78; Russia, 8; Italy, 7; Egypt, 1; America (Oneida Community), 1; total, 179.

Countries
represented.

Under the first section will be passed in review—not too minutely—apparatus connected with sporting generally, including shooting equipments, fishing tackle, baits, nets, traps, lines, and hooks. In the second section will be found apparatus and implements specially used in pisciculture and fish-curing. And the third section will embrace apparatus, appliances, means, and equipments for divers and those engaged in submarine and subaqueous works of every description.

APPARATUS
USED IN
SHOOTING,
FISHING,
&C.

Fishing
tackle.

SECTION I.

In the case contributed by M. Cleret (8, silver medal) both the fishing rods and tackle may be pronounced of fair average quality, such as are purchaseable of all the best makers. The same remark applies to the well-arranged collection supplied by M. Moriceau et Fils (13, silver medal). The assortment of tackle exhibited by M. Robillard, of Paris, is remarkable for a variety of floats emblazoned with the arms of all nations or fashioned into all kinds of grotesque figures. But it is necessary to premise that the winches and hooks are nearly all of British manufacture; and that the "flies" exhibited, if not actually made in England, are certainly tied to an English pattern. Perhaps to these contributors may be added M. Warner (11, bronze medal), whose case is but little inferior in its contents to those already mentioned.

In Great Britain, Aldred (1, silver medal) contributed a very complete arrangement of rods, lines, nets, and winches. He has been long notorious, both to the trade and the general customer, for his "glued-up triangular rods," each joint being composed of three pieces of carefully selected cane glued together longitudinally. The cane he imports himself, and keeps in store for a considerable length of time. These rods, as experienced sportsmen will testify, resist weather, and wear without warping or twisting, and retain their pliability under constant use. This same maker's "registered lever check and multiplying winch" possesses superior power and convenience from its very simple action and the ease of winding up the line under a weight of many pounds. Mr. Aldred also furnished an excellent collection of bows, arrows, and archery accoutrements. The arrows were delicate specimens of the inlaying craft in mother-of-pearl, ivory, and different fancy woods.

Ryder (7) (honourable mention) was remarkable for a collection of admirably finished winches, "secret multipliers," "salmon, and ratched brass salmon" winches. The case of Mr. Farlow (4), though containing articles of first-rate workmanship, was too small to receive further or particular notice. It is but just, however, to add that the collection of flies exhibited by this maker was certainly the best in the Exhibition, though this branch of the angler's art has not been very extensively illustrated.

From Class 40 a portion of the contributions were selected by the jury of Class 49.

Among these, Kirby, Beard, and Co., the well-known pin and needle manufacturers, have obtained a silver medal for their highly finished collection of well-tempered fish-hooks, harpoons, and grain-heads.

APPARATUS
USED IN
SHOOTING,
FISHING,
&c.

H. Milward and Sons, Bartlett and Sons, and Boulton and Sons also showed fish-hooks, harpoons, and eel-spears in Class 40.

Stuart, in Class 39, has received a silver medal for some machine-made nets exhibited by his firm of first-rate texture.

Machine-
made nets.

The articles exhibited under the head of fishing tackle in 1851 were almost entirely of British manufacture; but it is now found that many branches of the trade have their habitat in Paris and French manufacturing towns.

The appointments and appliances, and indeed every implement that is used in deep-sea fishing, have received from one country or the other with an extended seaboard a fair and satisfactory display. The Norwegian contributions may be especially cited as possessing all the features of excellence or practical value in equipments used in the capture of sea fish. Owing, however, to the confused numbering and imperfect separation of the exhibitors in Norway, we are only able to speak of the whole collection as that contributed by the nation. This does not prevent us, happily, from noticing the nets and lines which I. O. Dahle (21, silver medal), sends from Lövä. They were commendably strong; the herring-nets may be quoted as specimens of delicate yet strong texture. We cannot forbear to remark favourably upon the glass floats shown by Aasnæs, calculated, with proper care, to last out endless relays of cork floats (1), as well as the fisherman's leather dress sent by the Comité de Vardö (17).

Of the four exhibitors from Denmark the only one worthy of special attention is Fiodler (2), who contributes some well-finished nets of various sizes.

In Sweden the Institution des Pêches en Suede (8, silver medal), displayed an assemblage of models of fishing-boats in use on the lakes of the country, with lines and nets of the ordinary manufacture.

There were but two contributors from Spain. The nets of C. Falra (1, silver medal) were remarkable for their strength, evenness, and fineness of material. It would not be too much to pronounce these perhaps the best nets in the Exhibition.

Nothing worthy of special commendation reached the Exhibition from Russia in this class.

It is but just and proper to speak in terms of high praise of the array of appurtenances and the ample amount of MS.

APPARATUS
USED IN
SHOOTING,
FISHING,
&c.

and printed information belonging to deep-sea fishing exhibited by France. The machine-made nets of all sizes, together with fishing appliances of every description, sent by Broquant et Cie. (54, silver medal), indicated great care in their manufacture, being substantial and of the best material. In this collection a fancy silk net (tricolour) is sure to have attracted attention.

Derien, Camus (52), certified that no less than 1,200 codfish have been taken on one sinker and pair of hooks which he exhibited.

Jouannin et Cie. (70), transferred by the jury of Class 55 and 56, has been awarded a silver medal for a net-making machine worked by steam-power. The needful movements and combinations are effected automatically, and produce, at small cost, a superior article.

Peyron (42), who obtained a silver medal at Arcachon, exhibited a bait called "gueldre," which is the spawn of shrimp and small fry preserved in a special description of brine, which endures for twelve months. Its price is from 30 to 40 per cent. below the price of cod-roë, the bait in general use.

Singularly enough, Great Britain had but one contributor of lines and nets. Mr. Hounsell (5), of Bridport, worthily represented his country. Want of space alone seems to have prevented him from exhibiting every description of net, infinite as their variety is. The caplyn seine and lance bunt are seldom seen by a European public. The lance bunt used by the Newfoundland fishermen to capture the lance, which is used as bait for their hook and line fishing, has the smallest mesh of any deep-sea net. The twines, lines, nets, and canvas in this case need no further commendation, as they are in general acceptance by the public.

Buchanan (16), of Glasgow, furnished a case of fish-hooks in universal use along the British, Dutch, and Norwegian coasts, as well as those of Newfoundland. These hooks being of steel, are not only neater and stronger than the ordinary iron hook used on the coast of France, but they need less bait in setting the hook.

Hunting
and shoot-
ing equip-
ments.

Equipments and appliances for hunting and shooting were neither numerous nor remarkable for novelty. Among the French exhibitors, M. Bluteau Venier (12, silver medal) laid out a good case, in which the game bags were most conspicuous, being very highly finished, light, and strong. Boche (14, silver medal) had some powder horns and shot-belts of neat manufacture, and a cartridge-filling machine having separate compartments, by which the charge of powder and shot and the introduction of the wads are mechanically regulated.

Cart et Lallemand (15, silver medal), L'Esprant (16, silver medal), have contributed powder horns and cartridge cases of merit and suitability. Toft (24, silver medal) showed also excellent workmanship in game bags, gaiters, pouches, and leather work generally.

APPARATUS
USED IN
SHOOTING
FISHING,
&c.

The steel hawk and rat traps of M. Criton (35), though unrewarded, will be sure to have attracted the remark of any one specially interested in the destruction of vermin by the delicacy of their spring, and strength, and finish.

From the United States a very interesting and serviceable set of traps used for the capture and destruction of the smaller beasts of prey, such as the wolf, polecat, skunk, &c., was despatched. It is not out of place to record the fact that the Oneida Community, which contributes these specimens, is an associated body, mainly depending for their means of living upon the superior description of such traps as are here exhibited.

As objects of curiosity the snares and cloths for wolf hunting from the Royal Sporting Club, Stockholm, the Lapland gun and knife, Lapland sledge and snow-shoes, and the Laplander's reins may be mentioned among the contributions from Sweden, which were otherwise of no interest.

SECTION II.

The second section included instruments and appliances of pisciculture; apparatus for the hatching of fish, rearing of fish fry, transport of fish; aquariums, implements destined to facilitate the restocking of rivers—such as salmon ladders, salmon passes, &c.—and, finally, the plans of the establishments of pisciculture, and such scientific works as bear upon these subjects. To these may be added the utensils used in curing and preserving fish.

Apparatus
and appli-
ances for
pisciculture.

France may be signalized as the country more especially in which pisciculture has been systematised and developed. Indeed, it is the only nation which has, until within the last year or two, concerned itself in the rearing and distribution of the coarser breeds of fresh-water fish.

M. Carbonnier (7, silver medal) has bestowed no ordinary care in the rearing and improvement of eels. A large quantity of the fry of this fish he had selected for display in a glass aquarium. He also contributed two specimens of the pearl mollusc, on which he had successfully experimented.

Dr. Kemmerer, of St. Martin's, Ile de Ré (18, bronze medal), a well-known enthusiast in oyster culture, has prepared several pamphlets and MSS. on the breeding and rearing of oysters and mussels. Dr. Kemmerer is the in-



APPARATUS
USED IN
SHOOTING,
FISHING,
&c.

ventor of a tile covered with composition for catching the oyster spawn, so that it can be easily peeled off and a crop of oysters readily removed from the *parc*, or bed, where they are grown, to the *claire*, where they are fattened.

Among the contributors of pamphlets containing records of experiments Le Comte de Galbirt—who has long honourably distinguished himself by his administration over the piscicultural establishment at Buisse, on the south-east frontier of France—takes his customary place. He has been worthily awarded a bronze medal for his enterprising labour and perseverance.

Vicomte de Beaumont (39, bronze medal) displays lake trout produced from eggs received from the establishment of pisciculture at Huningue, as well as a specimen of common roach, produced from a couple acclimatised in the department de l'Avegron, where the species did not formerly exist. He also shows an improved hatching-box, with the tubes of the glass grating sufficiently close to prevent salmon fry from passing through them. After hatching, this grating is lowered to the bottom of the trough; the tap of the box allows the bottom of the apparatus to be cleaned without disturbing the fish, while three-fourths of the water is run out.

Of the contributions from the various French public departments, that forwarded by the Service Hydraulique du Département de la Sarthe was sufficiently complete. The specimens of various fish from the River Loire were displayed, as well as salmonidæ and eels raised in the departmental establishment. Here, too, are the various means of transport used by the service successfully in its manifold operations of pisciculture.

The appliances for transporting young fry consist of:—

1. Basket or hamper to contain 12 boxes of fry. Price 1*l.* 25*c.* (1*s.* 0½*d.*) The open wickerwork of this basket admits the circulation of air, a necessity for the transport of young fish.

2. Twelve boxes for the young fry to be packed in. Each 75*c.* (7½*d.*) The size of these boxes—1,500 to 2,000 fry can be placed in each. The wire gauze which covers three sides of each box is intended to promote the free circulation of air absolutely necessary for the young fish. Each is furnished with a sufficient quantity of moss for the separation of each fish, in order to prevent their contact with each other, a fruitful cause of mortality.

3. A larger box than the preceding, capable of keeping fry in health for as long a period as 20 to 30 days in case of need, and, when placed in running water, 40,000 to 50,000 fry. In this they can rest after a long journey, facilitating

their being forwarded, when a favourable opportunity occurs, without loss of time. This is a moveable reservoir, which can easily be placed in any stream of water and managed without difficulty; its price is 15f. (about 12s.)

4. A pail or bucket for the transport of young fry, to contain about 1,000. A grating, the lid of which is arranged to allow the water to be changed without fear of losing any of the fry.

This department has sent away this year to various applicants no less than 160,000 eels, with the loss during transport of barely a dozen fish. The piscicultural implements are accompanied by a full description of baskets, pails, hatching-boxes, and of the labours of the department and its results. The eel appears to be an especial object of favour and interest with all interested in the propagation of fish for food.

Donillard de Mahandière (40, bronze medal), who compiled a description of the Reservoirs du Bassin d'Arcachon and of the fish and produce it contains, exhibited fishing apparatus, plans for the establishment of reservoirs for live sea fish, and specimens of fish at various ages and stages of growth.

Leroy (30, bronze medal) is another of the enthusiasts striving to replenish with fish the salt portions of the Loire. Amongst his contributions were aquariums, floating tanks for small fish, which may be pronounced to be of the usual character and fair merit.

As might be expected, the French section was well supplied with pamphlets, suggestive and descriptive. Engaged in superintending pisciculture, M. Rimbaud, Thomé de Gamond, Lionel Benard (who treats of the different sources of salt in the world and its uses in various industries), Wallon, and Souberain may be named as those of special authority.

M. Ouizille et Cie., France (3, bronze medal), who have produced a model of a new boiler with a varied temperature, specially intended for the curing of sardines in oil, which not only economizes the cost of their production to the extent of 50 per cent., but improves the delicacy and flavour of the fish, by more easily removing the impurities given off during the culinary process. It is needless to add that this adjunct to the breakfast and luncheon table is daily becoming more appreciated, both in England and France.

The Commissioners of Irish Fisheries, Great Britain (4, silver medal), have taken considerable pains to illustrate the enterprise under their control. They showed four models of fish passes, the second of which may be erected over mill-weirs or dams of rivers without injuring or impairing the water power to the mill. The model No. 3 is of a pass which

APPARATUS
USED IN
SHOOTING,
FISHING,
&c.
—

may be built up stream, so as to discharge the water at the foot of the dam or weir, and thus form a lead easily found by the ascending salmon. Model No. 4 is of a pass built over a natural fall of rocks nearly 30 ft. high, in the River Collooney, in the county of Sligo, which has enabled salmon to ascend to the upper parts of the river, previously inaccessible, and has created there a very valuable salmon fishery. Mr. T. F. Brady, the secretary to the Commission, is distinguished as a designer of this kind of pass.

Besides the model of snap-net fishing for salmon, there were designs for gratings to prevent salmon entering mill races or leads; and a working model of an Irish trawl boat, with nets complete, for deep-sea fishing is worth examination. But the best evidence of the earnest purposes of this Commission is the fact that the chairman and secretary have designed objects and appliances already used with some success in their district fisheries.

The *Etablissement de Pisciculture d'Huningue* (silver medal) maintains the reputation which it has already acquired in Europe by an admirable display of its aims and functions.

Six of the most imposing tanks in the grotto aquarium, which was allowed to be one of the most prominent attractions in the *Jardin Reservé*, came from this establishment. We are tolerably familiar with the carp, jack, perch, &c., reared by this and similar establishments; but the fresh-water fish *Silurus Glanis*, disporting himself in tank No. 9, was certainly an unexpected sight for all interested in pisciculture. Efforts have been made by the *Acclimatisation Society of Great Britain* to show that the *silurus* will profitably stock the huge wastes of water with which our islands abound. It grows to the size of from 200 lbs. to 300 lbs. in weight where space and food are plentiful. It is reported to be superior to the salmon in flavour, and prefers to every other supply of food the frogs with which our ponds are infested, and which are not used by us either as food or a means of producing food.

It must be remembered that this grotto aquarium, and its more pretentious but less unsuccessful rival, the salt water aquarium, were the only representatives of the proposed class (82) which was set down as designed to embrace fish crustacea and mollusca. Every visitor to the Exhibition will remember the attractions offered by the singularity of the structure, the picturesque arrangement of the tanks, and the varied specimens of aquatic life contained in them, which were to be seen at the grotto aquarium. The grotto, it has been frequently remarked, itself afforded a grateful shade during the heat of the day, apart from any consideration of the practical purposes for which it was built.

In Norway, the Musée de Bergen (52, silver medal), was represented by a model of their establishment of pisciculture.

APPARATUS
USED IN
SHOOTING,
FISHING,
&c.

SECTION III.

Apparatus and appliances, means and equipments for divers and those engaged in submarine and subaqueous works of every description.

Apparatus
used in
diving and
submarine
works gene-
rally.

France is the only country contributing diving apparatus in this class. M. Cabirol (47, silver medal), who has obtained distinction for his diving apparatus and submarine lamp at the International Exhibitions inaugurated by that of 1851, affords a conspicuous collection. In addition to the ingenious lamp for submarine observations, which affords a continuous effective light under the water from the constant draught of fresh air derived from above to supply the combustion of the lamp, M. Cabirol also exhibits a very useful and simple apparatus of mouthpiece, piping, and air-belt for use in shallow water. Its cheapness may be appreciated by the fact that its price does not exceed 6*l.* sterling.

Messenger (48) furnished diving apparatus, the specialty for which he claims to be a leaden collar which can be released at will by a simple action of the hand, and the diver is thereby enabled to ascend to the top of the water almost instantaneously.

Galibert (50, silver medal) was distinguishable for his respiratory apparatus, which permits the wearer to penetrate into the midst of smoke and fire or to remain unharmed in foul air, choke-damp, &c. A reservoir of little more than two pounds weight communicates with the lungs by means of two tubes opening into a little case in the mouth of the operator, where it is kept steady by a slight pressure of the teeth. The air can be inhaled and exhaled several times during a space of from 15 to 30 minutes, and the wearer of the apparatus knows by the frequency of his operations when it is time to retreat.

For the sum of 125*f.* (5*l.*) the belt and cord, glasses, nose pincers, whistle call, and the metallic box which contains them all, are offered to miners, firemen, well borers, and those engaged in chemical experiments of every description. Half a minute suffices to inflate the reservoir, which is so simple in its construction that any one can use it without previous practice. As a means of escape from a ship on fire it was the subject of a favourable report from the Vice-Admiral Comte de Gueydon to the Minister of Marine.

The only gold medal in this class has been awarded to Messrs. Rouquayrol et Denayrouze (55 and 56), who have

Diving
apparatus of
Messrs. Rou-

APPARATUS
USED IN
SHOOTING,
FISHING,
&c.

quayrol and
Denayrouze.

obtained very favourable reports from the French, British, and foreign governments respecting their diving apparatus, which is capable of being employed in all subaqueous enterprises.

In the improved appliances furnished by this firm, the diver, to whatever depth he may be submerged, is always enabled to inhale air of the same pressure as that of the surrounding water. By the constant supply of fresh air afforded to the diver and the free escape of the air that he has breathed, the diver has been enabled to remain an hour and a half under water without any perceptible difference in his pulse or appearance. The dress employed in the new equipments being only used as a protection against cold, is lighter than the ordinary dress, and consequently permits greater freedom of action in working under water. The method of action of the apparatus also allows of its being used by men who have not been trained to it in any way, and without there being any fear of accident likely to endanger the diver's life.

The breathing apparatus, called by the inventors the "regulator," is entirely independent of the waterproof dress and helmet, and may be used either with or without them. The regulator consists of a cylindrical air chamber or reservoir, an air-box, with an air-valve connecting the two chambers; it is also fitted with a back plate, breathing-pipe, and straps.

The air-chamber is made of sheet iron or steel, of sufficient thickness to enable it to support the pressure of the condensed air and to give sufficient weight to the apparatus.

The air-box is made of thinner sheet iron, and is soldered on to the air-chamber.

The air-valve is fitted by a screw-threaded valveway into the air-box, and by an ingenious mechanical arrangement the exhaled air is returned into the air-box, whence it is discharged through the outlet valve, which is soldered on to the top of the air-box. This outlet valve is of very simple construction, consisting of two thin pieces of caoutchouc cemented together at the sides, but open at the top and bottom; the pressure of the surrounding water and the yielding nature of the caoutchouc prevent the water from entering the air-box, and render the action of exhaling perfectly easy.

On the Berge de la Seine a full opportunity to witness the working of this well-arranged set of diving equipments and apparatus was afforded to every visitor.

The rapidity with which the apparatus could be put into action, and the confidence with which it was employed by every one choosing to experiment with it, afforded additional

testimony of its value. It is, in a word, in point of safety, sanitary considerations, and simplicity, preferable to the ordinary apparatus.

The record of the experiment, by Lieutenant A. Denayrouze, of the French navy, who himself superintended the cleaning of the bottom of the armour-plated ram "Le Taureau," illustrates the practical value of the apparatus more emphatically than any conjecture or mere opinion.

The armour-plated coastguard vessel "Le Taureau" is a ship of 2,500 tons burden, and is fitted with a twin engine of 200 horse-power and a pair of two-bladed screw propellers. This vessel went out of dock on Nov. 17, 1865. About four months afterwards, say on March 15, 1866, vegetable deposits were remarked on the submerged portion of the armour-plating, near the water mark. This growth was about 5 in. or 6 in. long.

It was ascertained by a preliminary examination, made by means of this diving apparatus, that vegetation somewhat resembling tufts of heath had formed on the copper sheathing. This vegetable growth was intermingled with a large number of barnacles, or mussels, and on the vessel's sides were numerous minute shells. The armour-plating was covered with green slime of some length and thickness.

By order of the Vice-Admiral Maritime Prefect of Toulon, by way of trial, the cleansing of the bottom of the "Taureau" was undertaken.

The divers had first to be prepared. Among the crew there was only one man in the list of sailors that were employed who knew how to use the apparatus. There were stokers who had dived with the ordinary apparatus, and gunners and helmsmen who had never dived at all with any apparatus; also, the requirements of the service interrupted from time to time the progress of the work. The "Taureau" had to make three cruises to try its engines, and one cruise to St. Tropez. The following table gives the various details of the work.

APPARATUS
USED IN
SHOOTING,
FISHING,
&c.
—
Experi-
ments by
Lieut. A.
Denayrouze.

1866.	Names of Divers.	Time passed under Water.		Work done and Condition of Ship's Bottom.	Wind.
		A. M.	P. M.		
Mar. 14	Chastel, gunner, used to the apparatus.	H. M. —	H. M. 1 30	Cleaned port side at the fore. Bottom chiefly foul under the armour-plating. Brought up plants from 5 in. to 7 in. long. Used bristle brushes.	N.W. Chopping sea.

APPARATUS USED IN SHOOTING, FISHING, &c.	1866.	Names of Divers.	Time passed under Water.		Work done and Condition of Ship's Bottom.	Wind.
			A. M.	P. M.		
			H. M.	H. M.		
	Mar. 15	Aliziari, fireman -	—	2 30	Cleaned port side at the fore. Bottom more foul. The diver brought up green slime 3 c. m. say 1 ft. long. Used bristle brushes.	Calm.
	Mar. 16	Chastel, gunner -	1 30	—	Cleaned port side at the fore. Plants and small clusters of vegetable matter near the keel. Used bristle brushes.	Rain.— S.W. Rough.
	Mar. 18	Juisy, fireman - Aliziari, fireman* -	1 55 —	2 7 3 28	Cleaned port side at the fore, from abaft the turret to afore the funnel. Brooms and brass wire brushes used.	S.E.— Calm.
	Mar. 21	Doullié, fireman - Chastel, gunner -	1 45 2 6	2 35 3 17	Cleaned port side. Slime, plants, with very small barnacles or mussels. Brass wire brushes used.	S.—Calm.
	Mar. 22	Juisy, fireman† - Doullié, fireman - Chastel, gunner -	1 30 0 47 1 25	— 1 13 1 29	Cleaned starboard side, fore end. Same state of bottom as on port side. Wire brushes.	Stiff breeze, N.W.— Heavy sea.
	Mar. 23	Dupil, capt. of gun - Chastel, gunner -	1 25 —	3 2 1 28	Cleaned starboard. Wire brushes.	Cloudy. Calm.
	Mar. 27	Guérin, capt. of gun Dupil, capt. of gun	— —	1 10 2 2	Cleaned starboard. Wire brushes.	Stiff breeze, N.W.— Heavy sea.
	Mar. 28	Bernard, helmsman Guérin, capt. of gun Dupil, capt. of gun Chastel, gunner -	— 3 9 3 27 —	1 57 — — 1 52	Cleaned starboard, with wire brushes and bristle brushes.	Sharp breeze, N.W.— Rough.
	Mar. 29	Dupil, capt. of gun - Bernard, helmsman Guérin, capt. of gun Chastel, gunner -	2 20 — — 1 22	3 25 1 32 1 48 —	Cleaned starboard, with three divers under water together.	N.W.— Chopping sea.
	Mar. 30	Bernard, helmsman Doullié, fireman - Chastel, fireman - Guérin, capt. of gun	3 29 3 1 0 28 —	— — 3 15 2 4	Cleaned screw-propellers, rudders, horizontal shafting. Two divers under water together.	Calm.
	April 2	Bernard, helmsman Doullié, fireman - Dupil, capt. of gun Guérin, capt. of gun	— 3 3 3 15 3 22	3 15 — 3 41 3 36	Cleaned port. Three divers under water together.	Calm.
	April 3	Bernard, helmsman Dupil, capt. of gun Guérin, capt. of gun Chastel, gunner -	2 5 3 34 1 6 —	3 30 2 46 2 47 56	Finished the work with three divers under water.	N.W.— Chopping sea.

Total time occupied, 109h. 9 min.

* Is a very long while under water, but does not work quick enough.

† Is no longer employed to dive.

The chief difficulty consisted in deciding on a proper mode of sending the workmen to the various parts of the ship's bottom. However, this was accomplished very simply and conveniently by a contrivance that is particularly applicable to this description of work.

A rope ladder was passed under the ship's keel, from one side of the deck to the other; this ladder had wooden rungs; it was made stiff at the sides, and was moved fore and aft in compliance with the diver's signals. The diver took down with him an iron bar or stage, which was kept horizontal by a support hooked at one end. The diver used this bar or stage either as a step to stand on or as a seat to sit upon. He cleaned the straight, flat part of the vessel quite easily, and for this purpose stood upright on the stage.

But when under the keel and in the recessed or hollow part of the vessel, he found that by inflating his dress with air, and thereby varying his displacement or burden, he was able to come close against the vessel, lying nearly horizontally on his stage. Now, were he to have attempted such a change of position with the ordinary diving apparatus, it would have been very dangerous; in fact, he would have been liable to come up to the surface feet foremost. With this improved apparatus and equipment, however, the inhaling apparatus being quite separate from the dress, which acts merely as a protection against the cold, a diver can get to all parts of the vessel's bottom. Hence he is enabled to keep the submerged portions of the vessel perfectly and thoroughly cleansed.

The caoutchouc dress, properly speaking, serves the diver as a sort of bladder or air-bag, which he inflates or empties at pleasure, and thus varies the displacement about 30 cubic inches without interfering with the arrangements which regulate his artificial supply of air; and from this circumstance the diver is enabled to work with remarkable facility all over the hull below water-mark.

Sailors soon get accustomed to this description of work. The preceding table shows that gunners and helmsmen, though wholly unacquainted with the art of diving, managed after a few days to work several hours under water. They would only have been permitted to work for fewer hours; but, after they had remained three hours and a half under the water in the morning, they came up without fatigue, their complexion in a natural condition, and their pulses regular, they offered to go down again in the afternoon. Their arms only were somewhat tired in the evening, owing to their having while under water moved the brush continuously.

APPARATUS
USED IN
SHOOTING,
&c.

Men being thus enabled to move about the ship's bottom freely, can keep it thoroughly cleansed while the vessel is at sea. For this purpose no special arrangements of a character likely to involve trouble in fitting up at sea are necessary, such as scaffolding, stages, &c. Whatever be the weather or state of the sea, men can go under water and work at the vessel's hull with the rope ladder, the iron bar or step, and the pump on the deck or battery.

M. Denayrouze mentions that while engaged in superintending the cleaning of the "Taureau" they encountered two stiff breezes from the north-west; the work was, however, continued, and the divers found that at a depth of 5 ft. they ceased to feel the swell, and worked just as if in calm weather.

When they desired to come up they inflated the diving dress and floated on the surface of the water in an upright position; they thus got easily away from the vessel on which they were working, and went into a boat or raft near at hand, on which I usually placed the pump; but when there was too much sea I set the pump on the deck of the vessel itself.

IMPLEMENTS USED.—The divers removed the marine plants and the small barnacles or mussels with straight brushes made of brass wire.

DURATION OF THE WORK.—The preceding table shows that the process of cleaning of the "Taureau" occupied 109 hours and 9 minutes. A sailor, after having had two days' practice with the apparatus, can work five or six hours per diem under water. About 15 hours were lost in training men and getting the work well in hand, this sort of work being quite novel; but, without reckoning this, and calculating 15 hours as effective work, the time occupied represents 20 days' work for one diver. The process appeared to all the officers to be sufficiently expeditious for the object in view. In fact, the largest armour-plated vessels, such as the "Solferino," or the large English steamer, the "Himalaya," have a superficial area at bottom only twice that of the "Taureau." They could be completely cleansed every three or four months in about 220 hours by the employment of divers. If two men were employed, the largest vessels could be cleaned in 20 days. Moreover, if the practice of cleaning the bottoms every two months were adopted, the bottom would be much less foul, and the work would take less time, hence the limit of 20 days may be considered as the maximum for the largest vessels, if only two men were employed.

COST.—The cost of cleaning the "Taureau," performed by the crew, was for gratuities given to the men, a halfpenny per

minute for time passed under water, and for brushes and the iron steps or stages, about 450fr. (say 18*l*.) Now, a ship of the tonnage of the "Taureau," sent to dock, would, according to the official tariff, cost 2,000fr. (80*l*.) the first day, and 1,000fr. (40*l*.) the following days.

Now, even supposing the vessel were only one day in dock, which seems to me to be an extreme case, there would be considerable saving between the cost of 2,000fr. (80*l*.) and the cost of cleansing while at sea, viz., 450fr. (18*l*.)

We are not called upon to notice the diving dress and apparatus which Mr. S. Barnet exhibits in the British section, Class 50. It seems to be not fitted with any improvements that are not thoroughly known.

APPARATUS
USED IN
SHOOTING,
FISHING,
&c.
—

APPARATUS and PROCESSES used in AGRICULTURAL WORKS, and in WORKS for the PREPARATION of FOOD.—(Class 50.)—By PROFESSOR T. C. ARCHER.

PROFESSOR
ARCHER
ON AGRICULTURAL
WORKS, &c.

THIS class is one of several which serve to prove that the Imperial Commission has needlessly multiplied the divisions of the general arrangement, and have thereby led even their own officers into difficulty and confusion. For instance, the first section of the above heading specifies "Apparatus used in Agricultural Works." The same occurs in the description of Class 48, and under that class every noticeable object of this kind has been shown. Again, only one illustration of machinery or apparatus for the manufacture of artificial manures appears in the whole exhibition, and that is the ingenious machine shown by T. Carr of Bristol, called a patent disintegrator, for breaking up coprolites. This, however, is shown in Class 51 (4), and will doubtless receive notice from the reporter of that class. The only exhibitors of machinery for making bricks and draining tiles, which are, curiously enough, comprised in this class, are to be found in the British section, where will be found in active operation several excellent machines by H. Clayton and Co., of Harrow-road, London, W. (10), whose patent machine and pug-mill are capable of making 5,000 solid bricks or about 7,000 drain-tiles per day. Mr. John Whitehead shows a "two-cylinder machine," a most powerful and effective machine, which manufactures either solid or perforated and hollow bricks and drain-tiles. This is the same kind of machine, with some improvements, which was in the Exhibition of 1862 in London. Mr. Gregg's press is only a small-sized one; but he invites visitors to see one of full size, exhibited outside the Exposition, which is in full operation, making, it is said, from 35,000 to 40,000 common bricks per day. In these machines the principle is to force the clay out in a continuous length, of the requisite form, and cut it into bricks with wire cutters. Mr. Bawden's machine, however, which may be seen with the rest at work in the machinery gallery, presses the clay into moulds, six at a time; and, although slower in its operation, makes more perfect bricks. It is only applicable to solid bricks, of the ordinary size and shape. The engineer and machinist will fail to discover any novelty in the operations of these machines; but to the general public they afford much interest.

Brick-making
machines.

PROFESSOR
ARCHER
ON AGRICULTURAL
WORKS, &c.

DAIRY UTENSILS AND IMPLEMENTS.

Of dairy utensils very few are shown. In the French section but one exhibitor appears, who shows cheap serviceable milk-pans and other vessels, in tinned iron (135).

Holland, so famous for its dairy management, has taken the best means of illustrating this industry by building a model farmhouse with accommodation for a dozen cows, and a dairy fitted with every necessary appliance for making butter and cheese. It will be found in the park, between the avenues Brabant and Zealand; and, as it is a fac-simile in every respect of an ordinary Dutch farmstead, it will be seen with much interest.

Belgium has several exhibitors of churns (9, 22, 25, 28); Denmark one (1); and Italy one (29); but none of them possess any novelty of construction. They are exhibited, apparently, only for the purpose of showing the good workmanship of the exhibitors.

Atmo-
spheric
churn.

In the British section, besides one or two good churns (15 and 22), there is the newly introduced one of the Atmospheric Churn Company (Limited), which is entirely novel in principle, and is apparently as useful as it is new. It consists of a cylinder, with a tightly-fitted piston, the rod of which is hollow, and has an air-valve, by the operation of which, when the piston is moved up and down, the air is made to pass through the milk or cream, so as to keep it thoroughly agitated as if boiling, and the butter is thereby disengaged. It is said not only to act more easily and quickly than other churns, but also to separate the oleaginous particles from the milk much more completely. In the same section is a good display of the well-known manufactures of Mr. Duffield (13), who has long been famous for his boxwood butter-moulds, butter-spatulas, and numerous other useful articles of a similar kind.

Several other countries exhibit dairy utensils, but none of them presenting any special interest.

IMPLEMENTS &c., USED IN THE PREPARATION OF CORN &c., FOR THE SUBSEQUENT OPERATIONS OF GRINDING, CRUSHING, &c.

In the French annexe will be found a number of well-made machines for the preparation of corn by sifting, and for the husking of rice, &c.; but they, generally speaking, are of the most common kinds, on the principle of vibrating or rotating sieves of the required degrees of fineness. Several also are shown by the Austrians, amongst which one by Charles Euhurger, of Szegedin, in Hungary, is the best;

but it contains no less than twenty-two sieves, and appears to be unnecessarily complicated, and consequently expensive. A very clever little hand-machine, France (28), is shown by J. C. Andre, of Nismes, for the use of confectioners, liqueur-makers, and others, who require to husk almonds. The kernels are supplied through a hopper, and are made to pass through rollers sufficiently wide apart to prevent them from being crushed. These rollers are covered with a web of hair-cloth, having a short pile of india-rubber strips woven in. This pile is not more than the sixteenth of an inch high, and is strong enough to rub off the external skin of the almonds completely. Doubtless, this machine might be applied to many other similar purposes; indeed, there is a modification of it shown in the French annexe by Messrs. J. P. Fili et E. Barrabe, for husking and cleaning all kinds of seeds, which, from the samples shown with the machine, appears to work very satisfactorily. In the United States section, a smutter and corn separator (15) is shown of only moderately good construction; and in the British section, J. Baker, of Wisbeach, has a corn-dresser, which is well made, though without any novelty of construction.

PROFESSOR
ARCHER
ON AGRICULTURAL
WORKS, &c.

Husking
machines.

MILLS FOR GRINDING CORN, &c., AND MILLERS' ACCESSORIES.

Of portable corn-mills there is a remarkably good display in the French department. These will be found in the annexe. France has always held a very high position in this particular branch of mechanical engineering, and on this occasion, although no novelties have been produced, French exhibitors have given abundant proofs of the excellence to which they have brought this branch of their manufactures. The mill work of M. C. Touaillon, although entered as *hors de concours*, is particularly good and of a very miscellaneous character, including not only mills and millers' accessories for wheat grinding, but also starch machines and macaroni presses. The grinding mill of M. H. Cabanes (98), with its arrangements for ventilating and cooling the grain and flour, is apparently very good; but, like almost all the machines in this class, nothing but seeing them in actual use will give a fair idea of their real merits. Very excellent mustard-mills are shown (140, 144, 147); in the last, steam power is required, and the grinding is done by cylindrical stones revolving on a fixed surface, with scrapers to carry the ground material forward. In the United States section two good hand-mills, one for corn (1), and one for corn or spice (9), are shown, and in the agriculture annexe of Great Britain the mills and mill machinery of J. Lucas (20),

Corn-mills.

Mustard-
mills.

PROFESSOR
ARCHER
ON AGRICULTURAL
WORKS, &c.
—
Millstones.

Messrs. Riches and Watts (25), J. Pye, of Lincoln (31), and J. Whitmee and Co. (35), will be found worth notice. The French and Austrian millstones shown are of great excellence, and it is difficult to say which are the best. It must be borne in mind that these stones are all built up of pieces of the hard chert rock known as "burr stones," and that, consequently, the construction of a complete grinding stone of large dimensions out of such material is a matter involving great skill and careful workmanship. Those in the French section shown in the park are numbered from 151 to 159, and the Austrian specimens are Nos. 11, 12, 21, and 25. Those shown by other countries are not remarkable in any respect. A very curious kind of millstone is shown in the French annexe, by Mr. J. Aubin (151). Between the grinding ridges are deep channels covered with wire gauze, so placed that each groove acts as a little sieve; whether this answers or not it is impossible to say from a mere inspection of the arrangement. Near to this is shown (107) a most ingenious plan for dressing millstones; the apparatus is regulated by a scale, and a handle puts in motion a disc of metal with a black diamond fixed in its outer edge so as to cut the grooves in succession, with great regularity and nicety. The general character of the millwork in this class is neatness and compactness of construction, specially fitting it for farmers and colonists.

Starch-
cleaner.

Of machines connected with the preparation of the food starches the only noticeable one is that exhibited by C. Groult, of Paris (134), for the cleansing of tapioca, which is, however, little more than a sloping sieve with a vibrating motion. The sieve is in the form of a spout or shoot, broadest at the upper end, where it is fed from the hopper. The perforated part consist of plates of metal, each with holes of a different size, increasing downwards; a box is placed under each plate so as to catch what passes through, and the tapioca is thus sorted into different sizes. Its utility for this special purpose is not very great, but it is also recommended for separating various accidental mixtures of grain and seeds, the perforated plates being easily removed and replaced with others of the required sizes.

Sieve-cloths.

Several exhibitors show excellent specimens of bolting-cloths for flour-mills and sieve-cloths for general purposes. The silk gauzes for bolting-cloths shown by the French exhibitors are unrivalled; but not far behind them are those of Austria, whilst the exhibitors of that country have surpassed all others in the cheapness of the horsehair sieve-cloths they have produced.

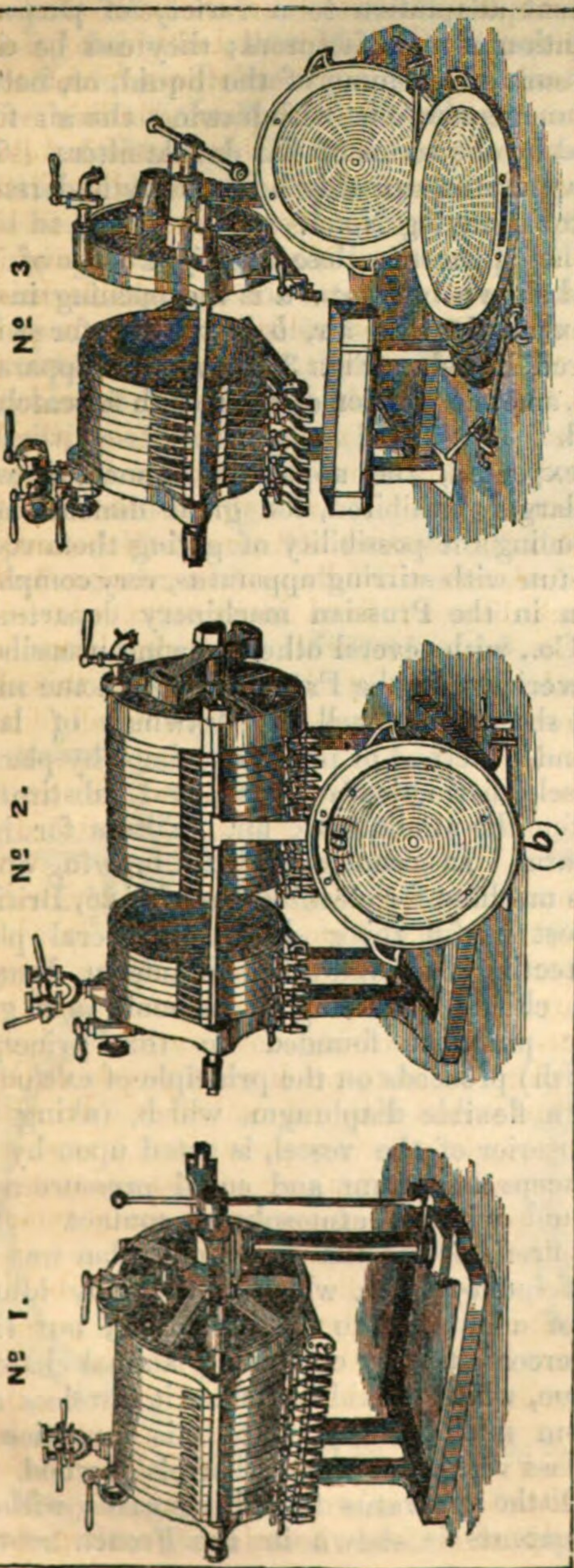
Filter-cloths, pulp-bags, and horsehair pressing-cloths

(étreindelles) for oil, &c., although naturally belonging to this section, have been, by the classification of the Imperial Commission, placed in Class 51, with chemical and pharma-

PROFESSOR
ARCHER
ON AGRICULTURAL
WORKS, &c.

Wine and
oil presses.

ENGRAVING No. 1.



Filter Presses of Messrs. P. Du Rieux and E. Roeltger, for the manufacture of Sugar.

ceutical apparatus.

Of oil and wine presses there is a large display in the French annexe, and a few in the Italian section of the machinery gallery; but, although in many cases bearing the labels for Class 50, they especially belong to Class 74; none of them present any novelty of construction, although much improvement in manufacture and increased power are shown in several of the French presses.

The filter-presses of Messrs. P. Du Rieux and Ed. Roeltger are well worthy of notice; they are chiefly adapted for sugar manufactories and refineries, and for such other works in which thick fluids

Filters.

PROFESSOR
ARCHER
ON AGRICULTURAL
WORKS, &c.

have to be removed from solid materials. The principle is not new, being in operation in almost every stearine manufactory; but the compactness of arrangement in these presses, and their consequent adaptation to a variety of purposes, is worth the attention of manufacturers; they can be used by the simple pressure of a column of the liquid, or, better, by a pneumatic arrangement for withdrawing the air from the cylinder formed by the series of flat double filters. The character of this apparatus can only be properly understood by reference to the Engraving No. 1.

Fig. 1 shows the apparatus closed. Fig. 2 one of the filters removed and shown in front: *a* is the opening in the metal frame for exhausting the air, *b* is the tap for withdrawing the filtered liquid. Fig. 3 shows the apparatus partly dismounted, and the position of the trough for catching the liquid material.

Brewing
apparatus.

As might be expected, the apparatus connected with breweries is not largely exhibited, the great dimensions of such objects precluding the possibility of giving them room. A large iron mash-tun with stirring apparatus, very complete, is, however, shown in the Prussian machinery department (3), Münnch and Co., with several other brewing utensils fit only for small breweries. In the French section some small utensils are also shown, as well as drawings of large breweries (149), and a method of preserving hops by placing them in iron vessels, hermetically sealed, and substituting carbonic acid gas for the atmospheric air. Filters for beer are shown by Bavaria. In connection with brewing apparatus, W. Robinson's machine for cleaning barrels (26, British) is perhaps the most useful thing shown. Several plans are shown for protecting beer and other liquids on draught from oxygenation, chiefly by forcing in carbonic acid gas; but none appear practical founded on this principle. S. Bourne (6, British) proceeds on the principle of excluding air altogether by a flexible diaphragm, which, taking the shape of half the interior of the vessel, is acted upon by the external air, and keeps a constant and equal pressure upon the contained liquid without atmospheric contact. The difficulty which at first stood in the way of this plan was the smell and taste of india-rubber, which is the only known material capable of adaptation to this invention; but they profess to have overcome this by combining animal charcoal with the caoutchouc, which is said to render it tasteless and absolutely free from smell. They adapt this invention to earthen jars and glass vessels, as well as barrels of wood.

A very useful little apparatus for tilting casks without disturbing their contents is shown in the French section

(13), under the name of Cric-Beziat. It requires a staple, or some other point of attachment in the roof of the vault or on the wall, and, as it is a lever worked on a strap, it can be made to tilt a cask without the slightest disturbance. For mixing fluids in casks M. J. C. Bignon (12), France, shows a useful and ingenious contrivance, called a "whip" (*fouet*). It consists of two flat metal blades, formed like scythes, but with holes through the blades to produce greater disturbance of the fluid. By a simple contrivance one of these blades can be rendered moveable or fixed at pleasure, so that by bringing both together, as in Engraving No. 2, fig. 1, they can be introduced into the bung of the cask, after which they can be opened and fixed, as in fig. 2. As the instrument is screwed into the bunghole of the cask by means of the screw (*a*), the blades pass through the screw, and form a handle (*b*), consisting of two pieces (*b b*), which are fixed by the slide ring (*c*) when ready for use, as in fig. 2: they are seen disconnected in fig. 1. By means of the handle (*b*), the expanded blades can be turned round rapidly, and form an excellent stirrer of any fluids contained in the cask.

ENGRAVING No. 2.

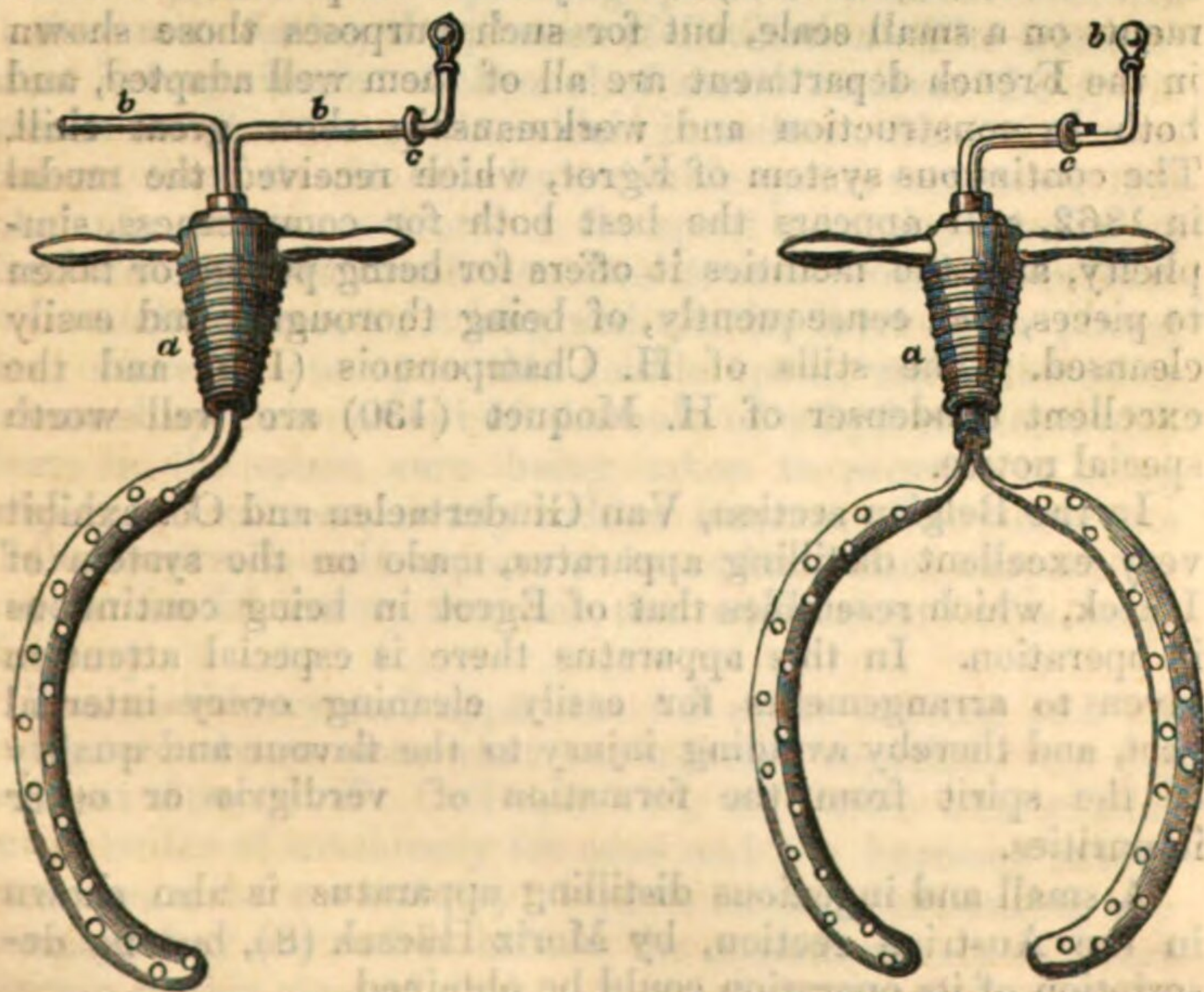


FIG. 1.

FIG. 2.

J. C. Bignon's "Whip" for mixing fluids in casks.

Many ingenious contrivances for corking bottles are placed in the French annexe amongst the exhibits of

PROFESSOR
ARCHER
ON AGRICULTURAL
WORKS, &c.

Class 50, but they belong especially to Class 60. Taps are also shown in this class, but they present no novelty worth special notice.

Several exhibitors show articles connected with the manufacture and storage of wine, but the only one of any practical value is the now well-known metal wine-bin shown as a British invention by Messrs. Farrow and Jackson (14).

Distillery
apparatus.

Distilling apparatus, like most of the important subjects of this class, is also specially arranged under Class 74. The reporter presumes that, as that class has special reference to purely agricultural structures and appliances, it is intended to bring under it only such distilleries, sugar-mills, breweries, &c. as are likely to be established on a small scale in large farming establishments, although that opinion is somewhat shaken by the fact that sugar refineries are also included. These difficulties occur at every point in the investigation of this class, and it seems they have influenced the committee of the class as well as the exhibitors, for in the revised edition of the Official Catalogue the explanatory notice which is found so useful at the commencement of many other divisions is wanting here. Most of the specimens of stills shown are small, and only fitted for private establishments on a small scale, but for such purposes those shown in the French department are all of them well adapted, and both in construction and workmanship show great skill. The continuous system of Egrot, which received the medal in 1862, still appears the best both for compactness, simplicity, and the facilities it offers for being put up or taken to pieces, and, consequently, of being thoroughly and easily cleansed. The stills of H. Champonnois (129) and the excellent condenser of H. Moquet (130) are well worth special notice.

In the Belgian section, Van Gindertaelen and Co. exhibit very excellent distilling apparatus, made on the system of Haeck, which resembles that of Egrot in being continuous in operation. In this apparatus there is especial attention given to arrangements for easily cleaning every internal part, and thereby avoiding injury to the flavour and quality of the spirit from the formation of verdigris or other impurities.

A small and ingenious distilling apparatus is also shown in the Austrian section, by Moriz Häsek (8), but no description of its operation could be obtained.

Automatic
controllers
for dis-
tilleries.

In the International Exhibition of 1862 there was shown, for the first time, a controlling apparatus for distilleries. It was invented by Theodor Steinberg, of Osseenovy-Koon, and was exhibited by the Russian Government. It was

stated that the employment of this apparatus had effected a great saving to that Government, as comparatively few officers were required to check the distillers, and the great evil of bribery was nearly cured. In the present exhibition will be found several automatic "controllers," the most perfect of which is in the Austrian section (Josef Körösi, 14); by this an exact record is taken of the quantity which passes from the still, and a small quantity of spirit is abstracted at regular intervals, and the strength recorded by a self-recording alcoholmeter. In order to obtain the quantity, a rotating disc raises a small metal bar for each vessel of a certain measure, which is filled and emptied, the latter part of the process taking place instantly when the measure is filled. The number of bars lifted thus shows the number of litres, or other measures, which have been filled. The machine exhibited is capable of measuring the quantity and strength of forty litres per hour, and it is stated that more than 4,000 of them are in operation in the distilleries of Austria and Russia. Another is shown by J. P. A. Vollmar, from the grand duchy of Hesse.

M. Moullier-Bertrand (France, 157) shows a very ingenious apparatus for separating spirits of different densities as they arise during the process of distillation. The arrangement is very simple: a channel of metal receives the spirit from a small reservoir in which it collects from the condenser; from this it falls by a double spout, suspended like a balance, into a receiver, but the spout is so nicely balanced that the slightest touch reverses it, and throws the current into another receiver; a long and slender lever is so placed that one end acts upon this double spout, whilst the other is moved by a rise or fall of the bulb of a hydrometer which floats in the spirit, care being taken to prevent it being subject to a current, or any sudden increase of the contents of the reservoir. It appears to be rather better adapted for use in the laboratory than for the requirements of a large distillery.

The machinery and apparatus for sugar making and refining are shown somewhat extensively, especially by the eminent firm, J. F. Cail and Co., of Paris, who exhibit entire suites of machinery for cane and for beetroot manufactories, and for a refinery; but, so far from presenting any novelty, they are rather behind the manufacturers of Great Britain in this class of work. Some of the machines in the French annexe for preparing beetroots by rasping and pulping are well made. One manufacturer in France (21) and another in Austria (16) show sugar-moulds made of hard paper (*carton durà*), which seem to be serviceable, cheap,

Sugar
machinery.

PROFESSOR
ARCHER
ON AGRICULTURAL
WORKS, &c.

The "Osmo-
gene."

and, of course, very light to handle. The only remarkable novelty in sugar apparatus is a dialyser shown in the French section by Messrs. Carmichael and Co., who call it an "Osmogene." It is a square wooden cistern, divided internally by fifty to sixty frames, on which are stretched sheets of vegetable parchment, about 3 ft. square, placed at short distances apart, with a proper arrangement of pipes and taps for supplying and removing the results. Warm water and molasses, or syrup, are let in alternately between the frames, and the whole kept at a temperature of from 70 to 80 cent., when a complete circulation ensues, and the pure sugar passes to the water, which thus depurates it without the aid of animal charcoal or other materials. It is said to answer well for beetroot syrups, and to be extensively employed for that purpose at the sugar works at Tour-du-Pui (Isère).

Of the apparatus used to make sugar into various forms of confectionery there are some excellent examples, foremost amongst which are the extremely well-made comfit-pans and sugar-grinding mills of L. Collier (11, British), who, besides, has machines of better workmanship than any other in the class for moulding drops, jujubes, and other sweets in great variety. Comfit-pans are also exhibited by France (50) and Austria (38), and a clever machine for making sugar drops is exhibited in the Italian section (30). Letang and Son (16 and 20) and Jacquin and Son (52, France) exhibit a very great variety of tin, pewter, and copper shapes for the use of confectioners.

Machineries
for bakeries.

The baking apparatus shown consists chiefly of several mechanical kneading-troughs, the principle in all being nearly the same, in other words, the helical blades invented by Rolland, and afterwards improved by Lesobre and Boland. They are shown in the French annexe, in the Italian machinery section, United States section, and an excellent one by Perkins in the British testing-house; but all the best varieties are shown in actual use in the French bakery in the park (*Manutention Civile et Militaire*), where all the operations of baking can be seen daily on a very large scale. No important change appears to have been made during the last 10 years in kneading, nor does there appear to be room for much, as it will be seen that the work done is most effectual, and the bread produced is such as it would be most desirable to have introduced into Britain. The cleanliness of all the arrangements connected with the French mechanical bakeries, and their superior economy to the dirty and slovenly hand methods, ought to ensure their general employment; but in our prejudiced country, progress is very slow. The French system of loaves of small

diameter, to ensure thorough baking, necessitates continuous ovens; and there are several shown besides those in operation. They are either upon the system of Rolland—that is, a rotating metallic floor, upon which the loaves move round and are brought regularly into contact with the more heated parts of the oven—or the continuous travelling system of Vicars, in which the loaves travel onward, and when baked are lifted into an upper chamber, whence they are removed. The ovens shown in the French annexe are all of small size. Some very excellent military cooking-stoves are exhibited, but they belong to Class 38.

The Austrian Commission exhibits a very useful and ingenious machine, which is used in the Imperial bakeries of that country. It is for the purpose of dividing the dough into equal portions for military or naval biscuits, and registering the quantity which passes through the machine.

Italy shows tin plates perforated for macaroni and vermicelli machines, but no complete machines for that manufacture; indeed, the only one shown is in the French annexe by Gros (142), a well-made and powerful machine, which has been bought by an Italian manufacturer.

The steam cooking apparatus of M. Egrot in the French machinery department is extremely simple and well constructed, and if effective, as stated in his brochure, must be a great advance upon the ordinary arrangements of large kitchens, all the operations being effected by steam, without the direct application of fire.

Cooking
apparatus.

The apparatus shown by the British Admiralty for cooking purposes is the most complete of any exhibited, and excited much interest.

M. J. Mareschal, of Paris (107), Widow Letang (20, France), and especially Mr. Kent, of London (19), exhibit a great variety of articles of domestic utility connected with the preparation of food, such as mincing-machines, sausage-fillers, egg-whips, pastry-moulds, ice-machines, refrigerators, wine-coolers, bread-cutters, apple and potato peelers and mashers, &c., which, although well-known articles of trade, are objects of interest in an exhibition which professes to comprise everything. Norway and Sweden show good, useful kitchen ranges with cooking apparatus, in which economy of fuel and compactness of arrangement have been carefully studied. In the French annexe are exhibited a few plans and models of stoves for drying corn and fuel, but they are of no special interest.

No noteworthy ice-making machines are exhibited but those of M. Carre and M. E. E. Carre, which are now well known, having been exhibited in 1862.

Ice making
machines.

PROFESSOR
ARCHER
ON AGRICULTURAL
WORKS, &c.
—
Gazogenes.

The apparatus for aërated drinks and gazogenes is shown extensively, whole cases being filled in the French department with syphons and gazogenes in every variety of pattern, but with nothing special to distinguish them from the common shop wares. There are, however, in the annexe (French) some excellent examples of the larger class of machines for producing aërated drinks. That of M. Berjot, jeune, of Caen, especially, is extremely well made; so also is that of Griffier (80), Ozouff (79), and Vielcuzal (83). M. Griffier's machine is stated to be capable of filling from 12,000 to 15,000 quart syphons per day. None are, however, better than the apparatus shown in the British department by Messrs. Fleet and Co. (16), which combines every arrangement for bottling soda-water, &c. Of coffee-mills and cafetières there is a very large number, but they only serve to prove to how great an extent this Exhibition has been converted into a bazaar.

Chocolate
machinery.

The chocolate machinery, on the other hand, is worthy of notice. Those made by G. Hermann (45), Bouvin (47), Debaliste (46), and Devinck (44). The machine shown in operation by the last exhibitor is remarkable for its ingenuity and the perfect manner in which it accomplishes its operations. These consist in folding the cakes of chocolate in sheets of paper, and sealing them at the same time, with the greatest precision and neatness. The mills employed have either cylindrical stones working horizontally, or they have circular stones working on edge or on their faces. The last answer best for the fine kinds of chocolate, the mixture for which liquefies during the process of grinding from the heat caused by the friction of the stones. In this state it runs easily into moulds, and sets as soon as cold.

In the United States of America machinery section is shown a very compact, powerful, and effective tobacco cutter, by H. Tilden, of Boston. Washing machines are principally exhibited by Bradford and Co., of London (7), Briggs, of Leeds (7A); also by one or two American exhibitors, but nothing novel, or worth special mention. All of them have been long before the public, and are largely advertised.

Water
filters.

Only two filters are worth noticing—that shown by the Silicated Carbon Filter Company, used by the British Admiralty, and an improved cheap filter, exhibited by W. Matchwick (21A), made with two large-sized garden pots, one being the filter, the other the receiver of the filtered water. The hole in the bottom of one of the pots is plugged with a piece of sponge. On this piece of sponge (inside the pot) is placed a small cap or wire grating, then a

layer of animal charcoal $2\frac{1}{2}$ inches thick, then a layer of clean sand 3 inches deep, and on that a layer of coarse gravel. To prevent the filtering bed being disturbed when the water to be filtered is poured in, a perforated top is placed on the gravel, on which the water is poured and through which it passes to the filtering bed. A wooden cover then keeps out dust and dirt. The second pot, or receiver, has a cover with a circular hole, and on this cover the filter is placed. The hole in the second pot is stopped with cement, and a common wooden tap inserted for draining off the filtered water. As garden pots are to a certain extent porous, both pots are coated inside with pitch; but it would be better if melted paraffin were used instead, as the water for some little time after the filter is first set up has a slightly pitchy flavour.

The merits of this filter are as follow:—Extreme cheapness (costing only about 4s.), great simplicity of construction (anyone could set it up), and excellence of operation, impure water passed through it being as much improved in quality as if it had passed through one of the more expensive filters.

Of silkworm nurseries, the most important shown are in the Italian, Portuguese, and French departments; but they consist almost wholly of the ordinary cheap cellular arrangement made by crossing slips of thin wood set on edge, adopted in all silk-growing countries. The Portuguese exhibitors, three in number (1, 2, and 3), have shown most ingenuity in arranging the cells and stands for holding them, and the feeding trays, so as to economize space and material.

Silkworm
nurseries.

The reporter is quite conscious that this account of Class 50 is far from satisfactory; but when it is borne in mind that it consists of a most miscellaneous series of articles, many of which should have been in other classes, and, still more, ought never to have been exhibited, except in the sale rooms of their owners, it is hoped that the attempt to set forth the little interest it may contain has not been absolutely unsuccessful.

Professor
Andrew
on
Agriculture
Works, &c.

has been running through the soil, then a layer of clean sand 2 inches deep, and on that a layer of coarse gravel. To prevent the filtering bed being disturbed when the water to be filtered is poured in, a perforated top is placed on the gravel, on which the water is poured and through which it passes to the filtering bed. A wooden cover then keeps out dust and dirt. The second pot or receiver, has a cover with a circular hole, and on this cover the filter is placed. The hole in the second pot is stopped with cement, and a common wooden tap inserted for drawing off the filtered water. As garden pots are to a certain extent porous, both pots are coated inside with pitch; but it would be better if melted paraffin were used instead, as the water for some little time after the filter is first set up has a slightly pitchy flavour. The merits of this filter are as follow:—Extreme cheapness (costing only about 4s.), great simplicity of construction (any one could set it up), and excellence of operation, impure water passed through it being as much improved in quality as if it had passed through one of the more expensive filters.

Of silkworm nurseries, the most important shown are in the Italian, Portuguese, and French departments; but they consist almost wholly of the ordinary cheap collar arrangement made by crossing strips of thin wood set on edge, adopted in all silk-growing countries. The Portuguese exhibitors, those in number (1, 2, and 3), have shown most ingenuity in arranging the cells and stands for holding them, and the feeding trays, so as to economise space and material. The reporter is quite conscious that this account of Class 50 is far from satisfactory; but when it is known in mind that it consists of a most miscellaneous series of articles, many of which should have been in other classes, and still more, ought never to have been exhibited, except in the sale rooms of their owners, it is hoped that the attempt to set forth the kind of thing it may contain has not been altogether unsuccessful.

silkworm
nurseries

NOTES upon the CHEMICAL PROCESSES in Class 51. By
DR. LYON PLAYFAIR, C.B., F.R.S.

DR.
PLAYFAIR
ON
CHEMICAL
PROCESSES.

Objects
exhibited.

I DO not at all profess to give a general report upon Class 51. The objects comprised in it were of the most multifarious and incongruous description, having really little bearing on chemistry. Apparatus and machines used in large manufacturing operations, requiring much elaborate description with numerous drawings to render them interesting or intelligible, were classified with omelette whippers and vessels for making American drinks and other unlike objects.

I confine myself therefore to noting in the first place those novelties in chemical processes which deserve to attract attention, and then such novelties in apparatus as can be described without elaborate mechanical drawings.

2. To the operations of bleaching calico and flax a considerable space was allotted in the French department. The exhibitors Tessié du Motay et Marechal from Metz (No. 31) showed a new method of bleaching flax by manganate of soda. The first operation consists in preparing this salt from the refuse of the chlorine manufacture. This refuse consists of manganese chloride which is precipitated with slacked lime, the resulting oxide of manganese being roasted in a current of air along with caustic soda. After this roasting, a mixture is obtained in which there is 66 per cent. of sodic manganate, besides sodic carbonate. To remove the latter the whole is dissolved in water, and a solution of sulphate of magnesia is added. Carbonate of magnesia and sodic sulphate are formed. The green sodic manganate is diluted with water, and is thus decomposed into manganic oxide and red sodic permanganate. The two precipitates are preserved; the magnesia carbonate being dissolved in hydrochloric acid as a substitute for the magnesia sulphate formerly used, and the manganic oxide being roasted with soda as before. The clear red solution of sodic permanganate, mixed with sodic sulphate, is now made of such strength that it contains 3 per cent. of sodic permanganate.

Bleaching
processes of
Tessié du
Motay et
Marechal.

The linen or yarn to be bleached is now rinsed in this solution for a quarter of an hour, and is passed through a squeezer to express the solution. It is then transferred to a vat containing a solution of sulphurous acid. The object of this is to remove any black manganic oxide deposited in the pores of the tissue during the bleaching. Part of the

DR.
PLAYFAIR
ON
CHEMICAL
PROCESSES.

oxygen in the black oxide is transferred to the sulphurous acid converting it into sulphuric acid, which dissolves out the manganous oxide formed by the reduction. After this has been effected the yarn or linen is put into the washing wheel and the whole process is repeated, commencing from the first bath containing the 3 per cent. of sodic permanganate. After a course of three such treatments yarn was well bleached before the jury, and without any appreciable deterioration of the strength of the fibre.

The chief merit of this plan consists in the rapidity with which flax and its products are bleached. The principle of bleaching is the same as that employed in the bleaching of calico, viz., to burn the colouring matter by oxygen. In the latter case this is done by means of chlorine and water, the oxygen of the water being the whitening agent. The permanganate of soda furnishes oxygen directly and apparently with efficiency. But no facts were laid before the jury to show the economical value of a process which is ingenious in overcoming various difficulties that naturally arise in it.

Bleaching
process of
Jarossan
and
Bastaert.

3. Another method of bleaching tissues, of calico or of flax and hemp, was exhibited by Jarossan and Bastaert, of Lille. The fibres of cotton tissues contain a small portion of resinous matter, and some fatty matters insoluble in water; these must be rendered soluble and be removed before the tissues can be bleached. In the common method of doing this very large boilers or becks are used in which the calico is successively boiled for many hours, first with lime and then with carbonate of soda. In these operations there is a large expenditure of fuel, of time, which is a valuable condition in manufacturing operations, and of lime and alkali. The object of the exhibitors is to economize all these by a change in the apparatus and in the mode of applying the alkaline salt. In the old method each boiling requires from five to eight hours, and an expenditure of from 6 to 8 per cent. of sodic carbonate for the yarns or tissues bleached; while the exhibitors claim to effect the same result with 2 or 3 per cent. of the soda salt for fine numbers of yarn, and 3 and 4 per cent. for the coarser kinds. The apparatus cleanses 300 kilogrammes of calico in an hour, or 2,500 kilogrammes in a day. On the old method four becks would have been required for this work, and the amount of steam would have been four times as great. The nature of the apparatus is shown in the following drawing. The material to be bleached being hung methodically as represented, is dipped into a cold bath of carbonate of soda, then transferred either by the movable

chariot shown in Fig. I., or by the crane in Fig. II. to a steam chamber, where it is exposed for an hour to steam, the waste steam of the chamber passing into a washing bath, which is to rinse the material. All the three vessels are of equal dimensions, the vapour bath being of iron, the other two becks of wood. The subsequent bleaching with chloride of lime is carried out by similar vessels, but it is stated that from the more perfect removal of resinous matter and fats by this method, the amount of bleaching material is economized, and the strength of the bath is weaker.

The exhibitors state that this apparatus is equally applicable to flax and hemp, which, however, from having more resinous matter than cotton require a larger proportion of the chemical agents.

The cost of fitting up an establishment on this plan to bleach from 2,000 to 3,000 kilos. of tissues daily is, including desiccators and other adjuncts, about 11,000 francs.

4. Lemoine, of 34, Rue St. Paul, Paris, exhibited various pharmaceutical products, among which were some bottles not likely to attract much attention, although they contained specimens well worthy of consideration. Cereals yield, as is well known, our most nutritious meals, but the value of these varies according as there is more or less of the outer parts of the grain left in the meal. The finest flour is far from being the most nutritive. Cereal grains consist of the true seed and the coating called *pericarpium*. The seed containing the embryo at its base is surrounded with food abounding in flesh formers. The pericarp or covering to the seed is made up of three layers, the outer one consisting of a skin of woody matter, being of scarcely any nutritive value, while the middle layer, or epicarpium, is formed of two series of yellow-coloured cells, and the interior of cells less coloured. In grinding corn in the usual way these layers are removed as bran, and much nutritive matter is lost. Thus flour contains about 13 per cent. of flesh formers, and bran 16 per cent. Bran, again, contains three times as much fat and five times as much saline matter as the same weight of flour. To throw it away or give it to pigs is a loss to human beings. Various mechanical devices have been contrived to separate the outer woody husk from the grains without encroaching on the cellular mass beneath, and some of these have been more or less successful. Lemoine does by chemical means the same thing, and, so far as one can judge from mere hand specimens, apparently effectively. The grains are steeped for 20 to 35 minutes in a three-per-cent. solution of caustic

Lemoine's
decortica-
tion of
grains.

DR.
PLAYFAIR
ON
CHEMICAL
PROCESSES.

soda at 60° Centigrade. By this means the outer or woody husk of the grain is so loosened that simple agitation in the bath effects its separation. For barley a bath of weak sulphuric acid is said to answer still better. The vitality of the seed remains uninjured, for barley so treated germinates in four days after this decortication. The ligneous husks being washed with water are stated to form a good material for the manufacture of paper. I was unable to ascertain that this process had yet been carried out on a large scale, but if the statements of the exhibitor are verified in practice he has undoubtedly solved an important problem.

Candle,
sugar, and
other
machines.

5. I do not attempt to draw attention to the machines or models of machines for manufacturing candles, sugar, gutta percha, and the like, shown in Class 51, both because they cannot be described without drawings and because they failed to strike me as possessing much novelty when compared with like machines used in our own country. There was indeed an elegant application of electro-magnetism to obtaining a fixed temperature for superheated steam in the distillation of fatty substances. I must refer simply to the makers' name, Leroy et Durand, Paris, for it would be impossible in mere description without drawings to make it intelligible.

Prussian
and
Russian
apparatus.

6. The exhibits in Class 51 in other countries besides France do not require special attention. Prussia exhibited much pharmaceutical apparatus of a cheap kind, the main object being compact construction and the economy of fuel. In Russia Professor Guedrello, of Moscow, exhibited well-constructed and cheap chemical apparatus.

England.
Apparatus.
Siemens.

7. Our English exhibits in Class LI. were few in number, and with some notable exceptions, were not marked in character. Siemens justly got the grand prize for his generators and furnaces, among the most important contributions to manufactures in modern times. They are too well known in this country to require description, but are likely to obtain a far more extensive development in industry than they have yet received.

Johnson and
Matthey.
Precious
metals.

8. Johnson and Matthey received a gold medal and honoured themselves and the country by their magnificent display of precious metals, and of their mode of preparation. Since the Exhibition of 1862 they have perfected the autogenic process of soldering pieces of platinum together. Formerly they were soldered by gold, and this method is still pursued in France, but the exhibitors effect the junction by laying a platinum wire along the junction and bringing to bear upon this the powerful oxyhydrogen flame

which fuses the wire and the edges of the plates so as to make them into one piece of metal. In this way one foot of a tube can be joined in about five minutes. Two platinum stills were especially remarkable for their size and beauty, both having been made by the autogenic method. One of them was large enough to concentrate 8,000 kilos. (8 tons) of acid daily, and was worth 62,500 francs. The other was fitted for 5,000 kilos., and was worth 41,000 francs. They were made with descending necks; but there were other retorts with ascending necks which are found to economize the acid by allowing it to flow backwards while the water still escapes as vapour.

9. Among the other medallists of the English part of the Exhibition were Stothert and Pitt, of Newark Foundry, Bath, who obtained a silver medal for expediting the process of tanning. This has often been attempted, but has generally failed. If Simon the tanner, of Joppa, were to come back to the world he would find leather tanned almost exactly in the same way that he followed. Any promising method of shortening the process deserves consideration and a fair trial. These exhibitors show a method not of their own invention, but that of Mr. Stephen F. Cox, of the Clift House, Tannery, Bristol. Former methods of expediting the process of tanning chiefly consisted in the use of more powerful tanning materials than bark, but these by acting too quickly closed up the pores of the hides, leaving the interior imperfectly tanned, and rendering the surface harsh and brittle. The usual plan of tanning is, after the removal of hair from the skins by means of lime and scraping, to put the skins in pits with spent tan, and then gradually into new pits with stronger tanning materials, as weak solutions are found best at the early stages of the operation. Forty-four weeks are spent in these operations in the usual way.

Stothert
and Pitt.
Tanning
process.

Mr. S. F.
Cox's
method.

Mr. Cox's improved process, as described by him, consists in so suspending hides in the interior of a rotating frame, drum or cylinder, as that they shall alternately roll or fold up, and again straighten whilst immersed in the tanning liquor; the action is very curious, and gives you the notion of a live struggling mass, like a net of worms or eels; the hides tumble over in an extraordinary manner, and the liquor exudes and is drawn in again. The cylinder revolves about once in a minute, and the operation of the motion shifts the hides from the concave to the convex form and back again, which produces an alternate opening and closing of the different pores of the skin, converting each of them into a species of pump, compressing it, and causing

DR.
PLAYFAIR
ON
CHEMICAL
PROCESSES.

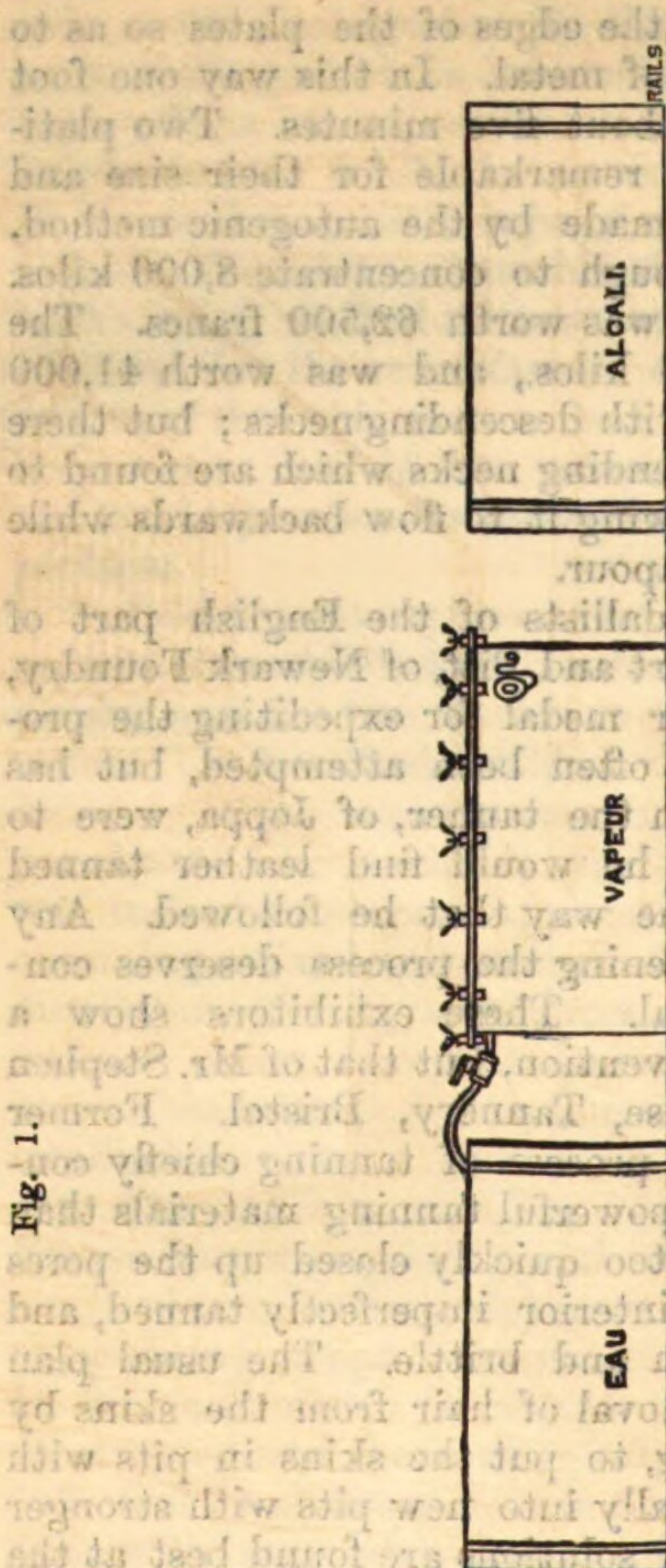
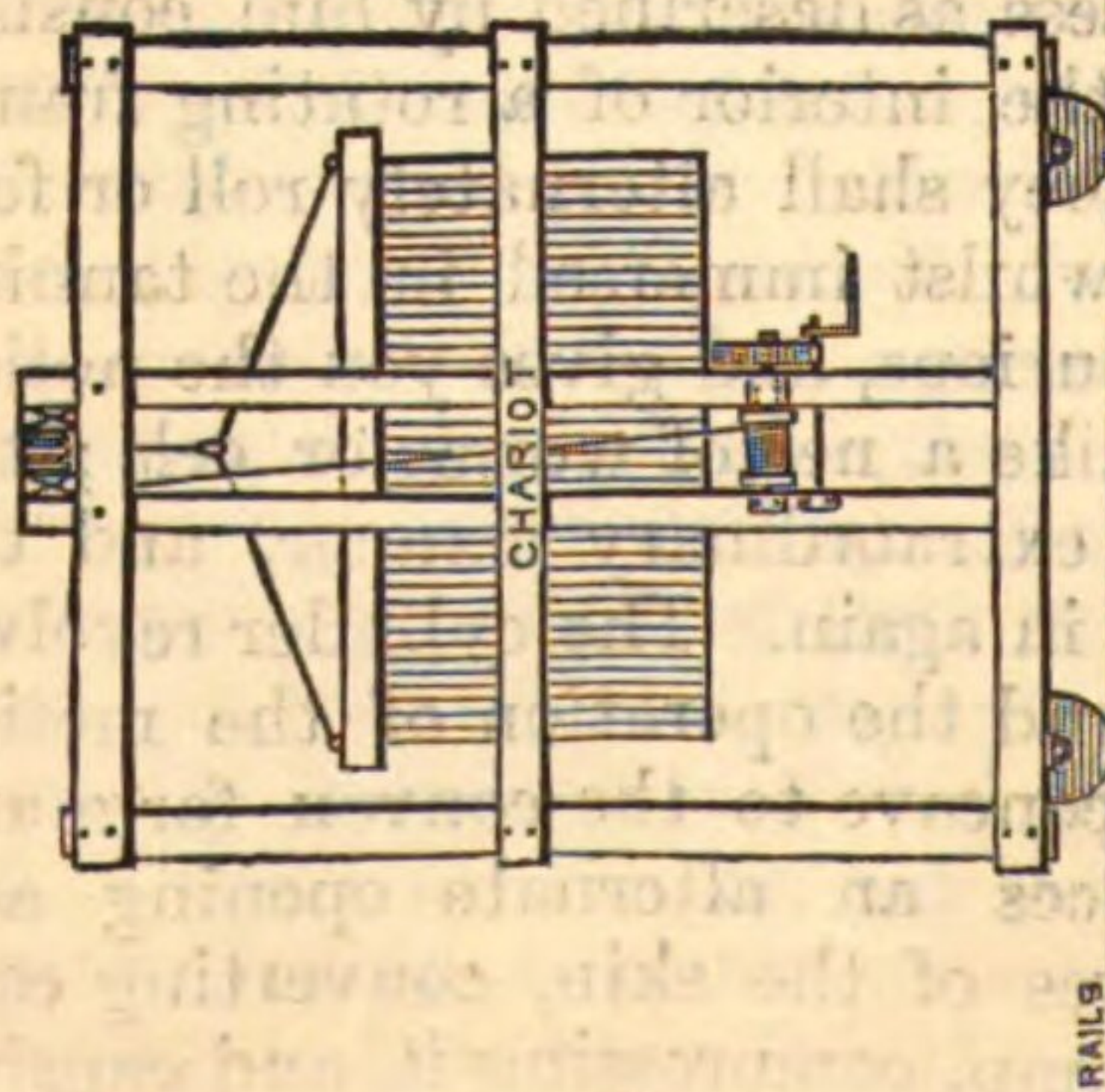


Fig. 1.

Conclusion.



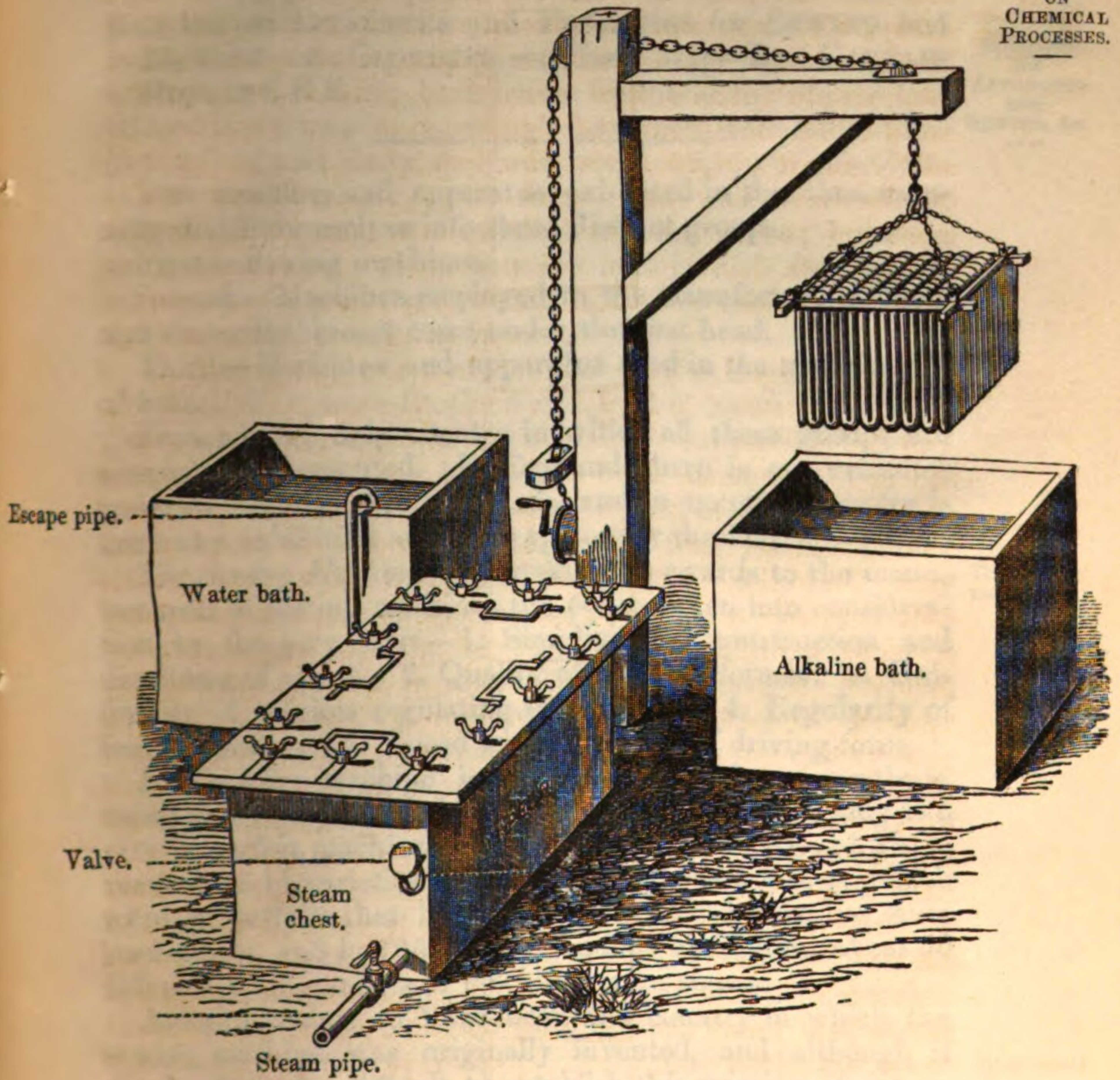
it to expel, opening it, and causing it to re-imbibe, and these hides rolling over in this drum cleanse the surface of the pore, and bring fresh liquor in place of the exhausted portion.

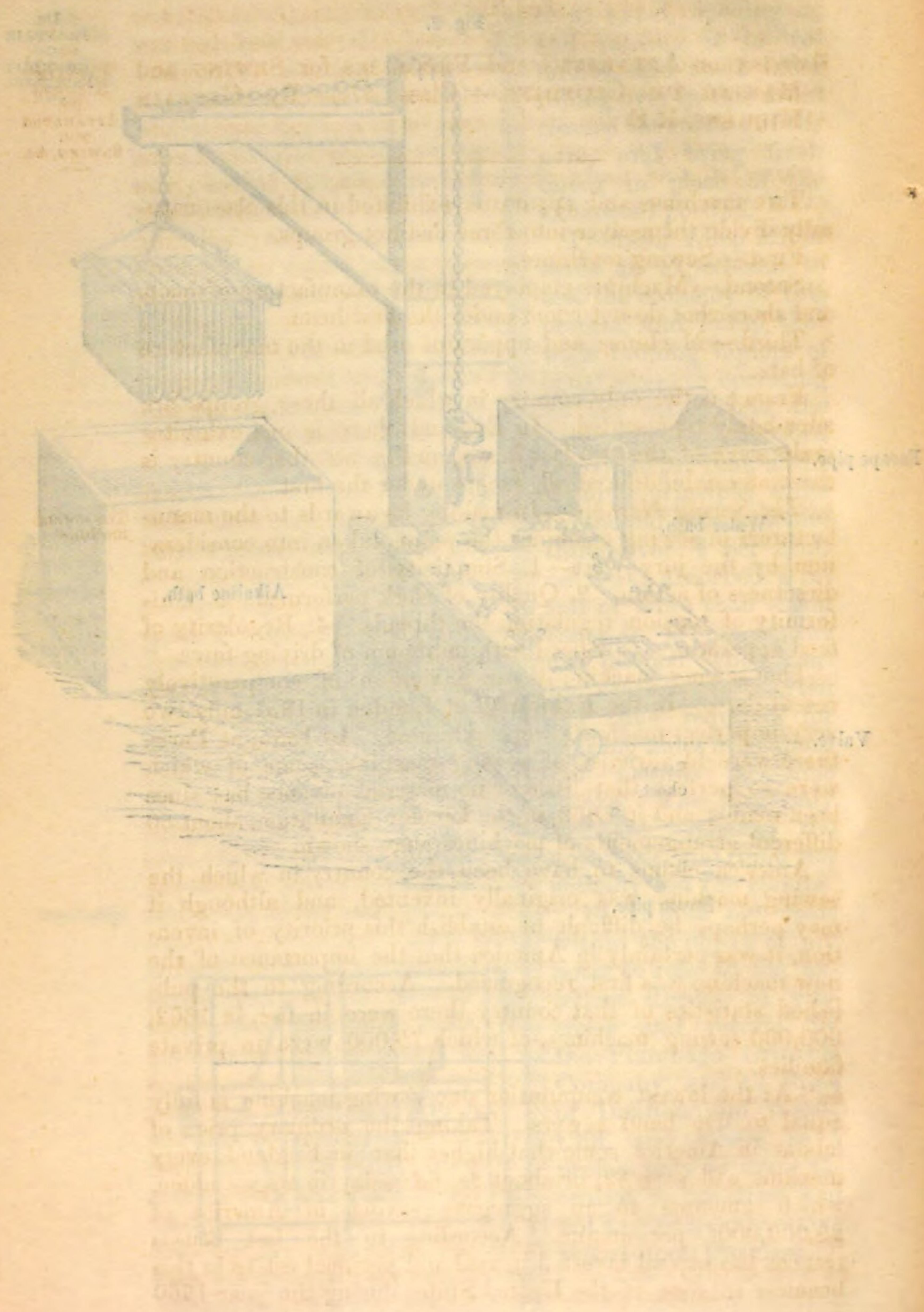
Professor Allen Miller made an experiment to test the economy of this process, and found that with tanning liquors of equal strength operating for the same time, the new process absorbed nearly 36 per cent. of the tanning principle, while by the old process something over 4 per cent. only was absorbed, a result of more than seven times in favour of the new method. The inventor professes to shorten the time required for tanning hides from about ten months to nine weeks. The jury only saw the model of the apparatus, and could not actually test the results.

10. It does not come within the object of my notes to refer to the excellent display of crucibles and retorts, by the Plumbago Crucible Company, and to those of Doulton and Watts, Cliff, and others, as I profess only to draw attention to novelties, and not to give an exhaustive report upon the class.

Fig. 2.

DR.
PLAYFAIR
ON
CHEMICAL
PROCESSES.





REPORT ON APPARATUS and PROCESSES for SEWING and MAKING UP CLOTHING.—(Class 57.)—By CAPTAIN HICHENS, R.E.

CAPTAIN
HICHENS
ON
APPARATUS
FOR
SEWING, &c.

THE machines and apparatus exhibited in this class naturally divide themselves into three distinct groups.

First.—Sewing machines.

Second.—Machines employed in the manufacture of boots and shoes that do not come under the first head.

Third.—Machines and apparatus used in the manufacture of hats.

France is the only country in which all these groups are adequately represented. In England there is one exhibitor under each of the two last heads, and in no other country is there any exhibition at all, except under the first.

The Sewing Machine.—In making its awards to the manufacturers of sewing machines the points taken into consideration by the jury were—1. Simplicity of construction and directness of action. 2. Quality of work performed. 3. Uniformity of tension regulating the threads. 4. Regularity of feed apparatus. 5. Speed with minimum of driving force.

The sewing
machine.

The sewing machine is an invention of comparatively recent date. In the Exhibition at London in 1851 only two very imperfect machines were exhibited. In 1855, at Paris, there were 14 varieties of sewing machines, some of which were so perfect that little or no material advance has since been made; and in 1862, in the London Exhibition, about 50 different arrangements of machines were shown.

America claims to have been the country in which the sewing machine was originally invented, and although it may perhaps be difficult to establish this priority of invention, it was certainly in America that the importance of the new machine was first recognized. According to the published statistics of that country there were in use, in 1862, 300,000 sewing machines, of which 75,000 were in private families.

“At the lowest computation one sewing machine is fully equal to five hand sewers. Taking the ordinary price of labour in America somewhat higher than in England, every machine will save \$2, or about 8s. 6d. a day in wages alone, which amounts to an aggregate saving in America of 29,000,000*l.* per annum. According to the last census returns the capital invested in real and personal estate in this business in nine of the United States during the year 1860

CAPTAIN
HICHENS
ON
APPARATUS
FOR
SEWING, &c.

was 289,656*l.*, employing 2,194 hands. The cost of labour was 221,520*l.*, and 116,330 machines were made, valued at 1,167,780*l.* In England the general introduction of sewing machines has been retarded by litigation and other causes; but within the last two years their use has been greatly extended. The best American machines, which were formerly excluded, have been largely imported since the expiration of Thomas's patent in 1846.*

In the "Exposition Universelle," now open in Paris, there are no less than 87 exhibitors of sewing machines. Their manufacture is now very general in European countries. France has 27 exhibitors, America 21, and England 12. Even so small a principality as Hesse has two exhibitors of sewing machines; the colony of Canada five.

Most of the French machines are from American patterns; but they are well made and often very tastefully finished, though their prices are generally considerably higher than those asked for by English manufacturers for similar articles. It is natural that on her own ground France should be the largest exhibitor; and, indeed, the space allotted to England has made it impossible for her to rival France in quantity, whatever she may do in quality. America has a very fine exhibition of sewing machines, in which branch of industry she is represented more fully than in any other class. Room has been found for them in a separate building in the park, where some locomotive engines and other railway apparatus are also placed.

The question of the effect of the introduction of the sewing-machine upon the social condition of needlewomen is very interesting; and it fortunately appears that not only have wages very generally risen, but that the number of hands employed is not diminished.

In the shoe trade, for example, the average wages of needlewomen before the introduction of the machine was from 8*s.* to 10*s.* a week, rarely 12*s.* The average earnings of women using the machine is about 14*s.*; some very good hands earn much more, 20*s.* or 24*s.*; and slow and inferior workers about 10*s.* Even those women who are found not able to work the machine to advantage are no losers by the increased prosperity of their sisters; they are employed as basters to put the work roughly together for the machinists, and are paid about 10*s.* a week.

Influence of
the inven-
tion upon
labour.

In the shirt trade the advantage to the needlewomen is

* This is an extract from "The Exhibited Machinery of 1862, by D. K. Clark, C.E.," to which very valuable work I have been largely indebted for the following sketch of the early inventions of sewing machines.

even more marked. I am informed by one very large wholesale manufacturer that the average rate of the earnings of the women he employs is as much as 20s. a week; that he is dissatisfied, and expresses dissatisfaction, if they earn much less; for the best piece-workers are the most advantageous to the manufacturers. The introduction of the sewing-machine has augmented the consumption of the manufactured article and increased the demand for sewing-women. Good seamstresses who prepare the work for the machines, and who formerly were paid about 12s. a week, now receive 15s. There is a very rude class of needle-women, very inferior hands, whose wages remain much as they were, but whose work is much lighter than it used to be. One very satisfactory aspect of the revolution wrought by the sewing-machine is that it has raised a demand for, and carried employment into, a new and more respectable class of women. A very considerable and good class of machine-workers, wives and mothers of families, have their own machines and do the work at their homes. There is, however, a great impediment to the general adoption of this arrangement in the very high price of a good sewing-machine. It is difficult to know to what this high price is due. In most trades competition tends to keep prices down to a fair standard, but in this particular industry the difference between the prime cost of the machine and its retail price is out of all proportion.

The American Government requires, for revenue purposes, returns of the money spent by manufacturers in wages of labour, the cost of material, &c. From these returns it is easy to make out a tolerably correct estimate of the average cost of a sewing-machine in America; this will be found to be about 3*l.* 10s. each. The cost of construction is certainly less in England than in America. I have now before me the price-lists of the manufacturers of almost every nation, and it is satisfactory to observe that the English prices are, on the whole, for the same class of machine, lower than those of other countries. Yet, even in England, a foot-working sewing-machine by one of the old-established houses costs 10*l.*, and this, it must be recollected, is the cheapest article offered by the manufacturer, so that the average retail price, which is the sum to be compared with the average cost price of 3*l.* 10s., is enormously high. Some firms advertise machines at the low price of 7*l.*, but their construction is not quite so solid as might be wished. There can be little doubt that a decreased price would so augment the demand as to very materially benefit, not only the purchaser, but the producer.

CAPTAIN
HICHENS
ON
APPARATUS
FOR
SEWING, &c.

As printed
by

London
Printed
by

CAPTAIN
HICHENS
ON
APPARATUS
FOR
SEWING, &c.
—
History of
invention.

In all the early attempts at constructing a sewing-machine the inventors tried to imitate the stitches made by hand, in which a single needle and thread is used, the needle having the eye at the opposite end to the point. The first modification which became necessary was a double-pointed needle with an eye in the centre, which enabled the machine to dispense with the continual inversion of the needle which obtains in hand sewing. The end of the thread was attached to this centre eye, and the needle was drawn through the cloth in alternate directions by grippers placed one on each side; the one above letting go its hold as soon as the needle was seized by the one below, and so on.

Heilmann's embroidery machine, and that invented in 1755 by M. Weisenthal, a German, were on this principle. The stitch is the simple tacking or chain stitch.

The lock-stitch was first introduced, in 1835, by Mr. Walter Hunt, of New York. It was made by two continuous threads; but, as there was no apparatus for producing the necessary tension to tighten the stitches, it proved useless.

In 1841 Newton and Archibald invented a machine for tambouring the backs of gloves.

In 1842 Mr. John Greenough, of the United States of America, patented a machine for applying the shoemaker's stitch from a single thread by means of the double-pointed needle previously invented by Weisenthal.

In 1843 Mr. Bostwich patented a running-stitch machine. It had two toothed wheels, which, working together, crimped the material and pushed it against a stationary needle.

In 1844 Messrs. Fisher and Gibbons, of Nottingham, invented a machine for embroidering, which, by means of a needle and shuttle, formed the lock-stitch which was afterwards adopted by Messrs. Grover and Baker, who produced a practical sewing-machine.

Improve-
ments in
machines.

In 1846 Mr. Elias Howe patented in America the machine still known by his name; and this machine, with the exception of the feed motion, which was defective, as not being continuous, embodied all the principles of the best recent manufacturers. A straight needle carried by a slide has now generally been substituted for Mr. Howe's curved needle, and either the four-motion feed or the top feed for his baster-plate. The baster-plate was provided with sharp points sticking up on one edge, on which the cloth was adjusted and carried step by step through the machine. When the whole length was traversed, the baster-plate was taken out and the cloth re-adjusted. This arrangement was found inconvenient, and it wasted much time; but it

was not until 1849-50 that Mr. Wickershaw invented the first really practicable feed motion. He substituted for the baster-plate a wheel with a broad roughened edge protruding slightly above the surface of the work-table. The cloth was held down lightly on this surface by a pressure-plate. The wheel was given an intermittent rotatory motion, which carried on the cloth by friction with its roughened edge.

The next improvement in the feed motion was that called the four-motion feed, which consists of a flat serrated plate working through an opening in the table with a horizontal and vertical motion. The cloth is held down on the feeder by a presser, and is passed forward the length of the stitch by the forward movement of the feeder, which then, by its downward vertical motion, releases the fabric, and returns by its back horizontal motion to its original position, in readiness for the next stitch, to accomplish which it rises by its upward vertical motion into contact with the cloth, which is again carried forward the required distance.

This four-motion feed was first applied in England to the Grover and Baker machine. It is a most important improvement on the wheel feed, especially for all purposes of delicate or ornamental sewing, though the latter answers sufficiently well for heavy manufacturing purposes.

In the wheel feed the needle works on one side of the feeding surface, but in the four-motion feed the needle can operate in the centre line of that surface.

A further modification of this four-motion feed has since been made, in which the feeder operating from above does away with the necessity of the pressure foot, and is much preferable to the under feed, as being far less liable to injure the edges of the fabric submitted to its operation. The principle of its motion is the same as that of the four-motion feed.

The three principal stitches formed by the sewing-machine are—the lock-stitch, the double-chain-stitch, and the single loop, or chain-stitch.

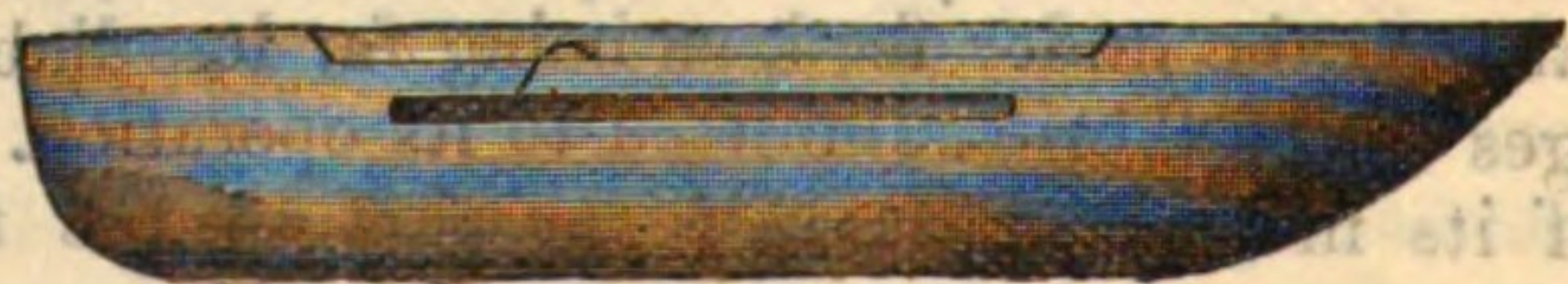
The *Lock Stitch* is formed by two threads, the upper one being carried by a needle with its eye near the point. This needle is driven through the fabric, carrying the thread with it. The thread passes through the eye, as in hand-sewing, not fastened to it, as in the early attempts at machine-sewing. The needle is then partially withdrawn, so as to form a loop of the thread underneath the fabric. Through this loop the under thread is passed by means either of a shuttle or a revolving hook, the former being most generally employed, though the latter works excellently for the lighter kinds of work. The stitch is formed as shown in fig. 1, page 138. When

Description
of stitches,
&c.

the under thread is thus either by shuttle or hook passed through the loop, the needle is wholly withdrawn, carrying up the loop thread, and with it the under thread, forming a lock in the centre of the fabric.

The tension necessary to tighten the stitch is obtained for the upper thread in various ways, either by applying friction direct to the thread itself or to the spool on which it is wound, or to a roller upon which the thread is passed on its passage from the spool to the eye of the needle. The most usual plan is by direct friction on the thread. This is effected by passing it between two discs of glass, or porcelain, or metal, which is adjusted to the required tightness by means of a screw; or by passing the thread through a succession of little holes in a thin metal plate, the friction being more or less according to the number of holes used; or by passing the thread round and round a metal bar, the number of turns regulating the friction. The latter is the simplest, and is most easily adjusted.

The under-thread tension is effected in the ordinary shuttle by passing it through holes in the side of the shuttle itself, as shown in the following diagrams:—

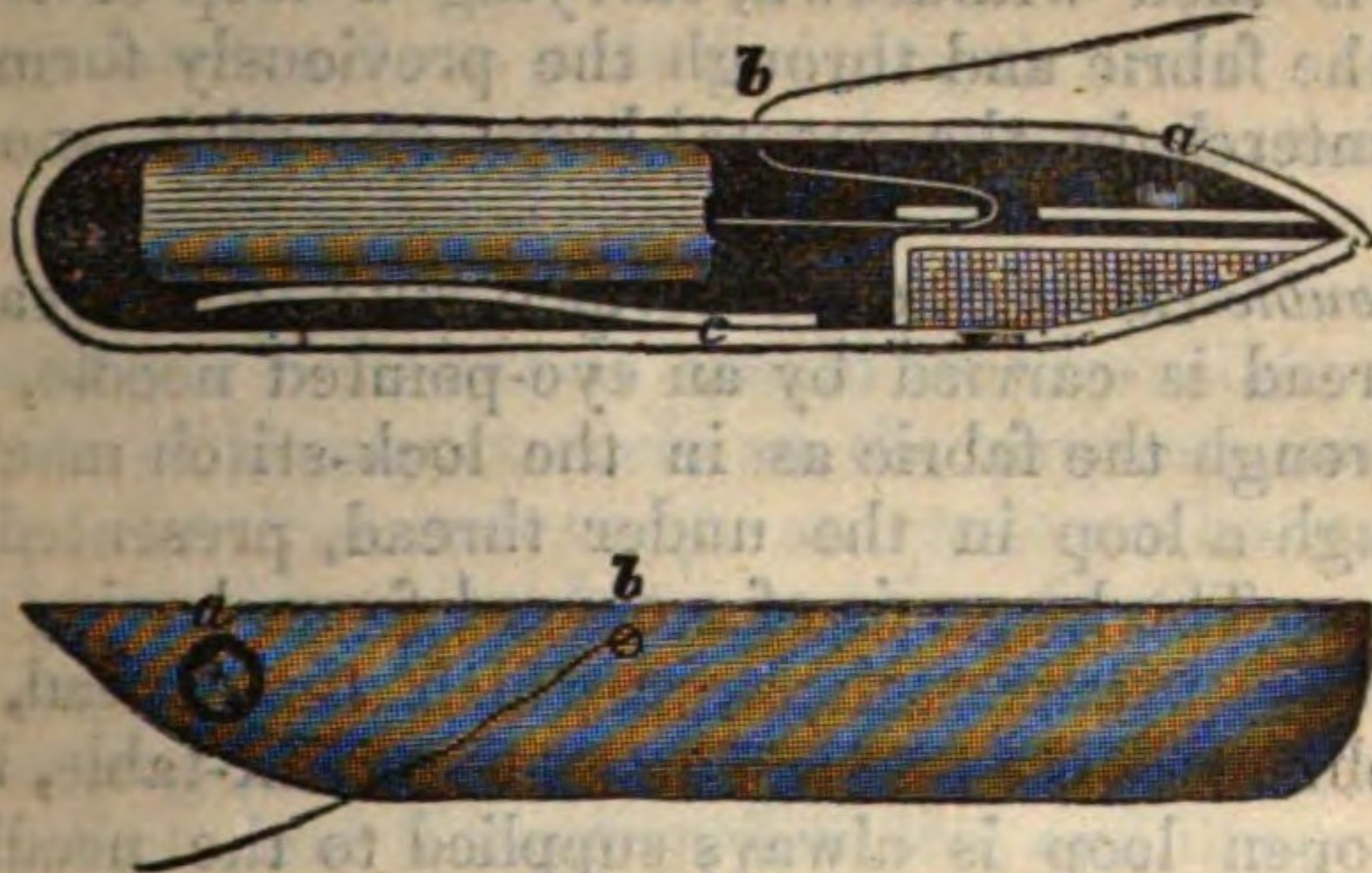


THE ORDINARY SHUTTLE.

In the new shuttle devised to hold the cartouche of thread invented and patented by M. Marc Klotz, of Paris, the thread is passed between two thin metal plates (see diagram), adjusted by a screw (*a*), and is then carried through the hole (*b*). The advantages proposed to be gained by this cartouche are saving of time, as the thread is ready wound for use, and has not to be first taken off the reel and then re-wound on

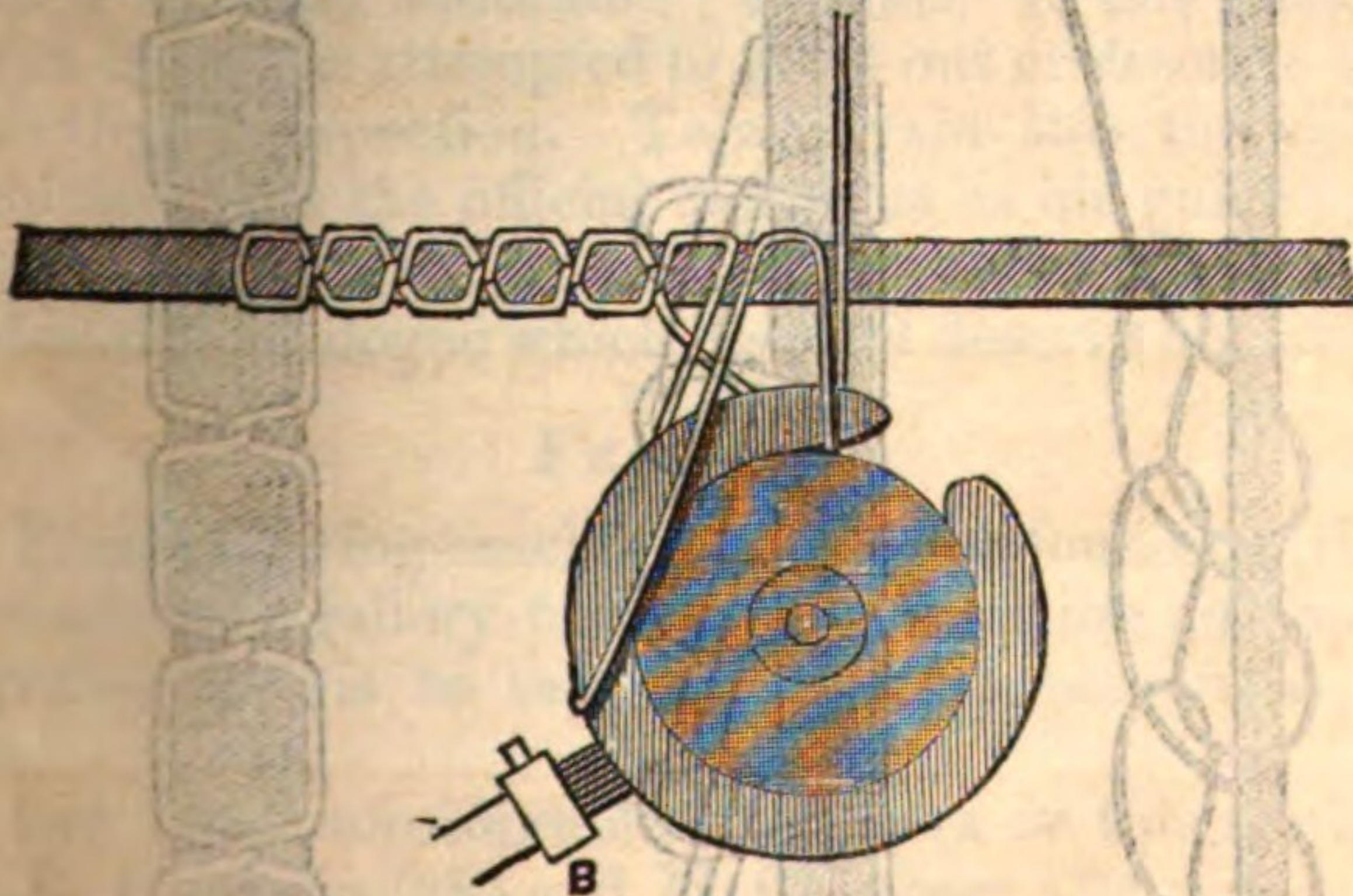
the spool, as in the old shuttle; saving of time and trouble in the frictional apparatus of the shuttle. The cartouche is kept in its place by the spring (c).

CAPTAIN
HICHENS
ON
APPARATUS
FOR
SEWING, &c.



NEW SHUTTLE INVENTED BY M. MARC KLOTZ.

In the rotating hook used by Messrs. Wheeler and Wilson, and since adopted by other manufacturers, the tendency of the spool to revolve in the direction of the hook gives the necessary friction and tension to the under-thread; it may be increased, if necessary, by the small brush (B) (see diagram). This tensional apparatus is defective, and the machine is only adapted for family use or very light manufacturing purposes.



MESSRS. WHEELER AND WILSON'S ROTATING-HOOK.

The Single-chain Stitch has the property of being very easily unravelled, which, for some sorts of work that may be required to be unpicked, is rather an advantage; but, of course, its use is not so general as that of the lock-stitch. The chain-stitch is chiefly used for sewing the soles of boots and shoes. In this heavy leather-work a waxed thread, stout and strong, is required; and leather-stitching machines are generally known as waxed-thread machines. The stitch is

CAPTAIN
HICHENS
ON
APPARATUS
FOR
SEWING, &c.

formed in much the same manner as the crochet-stitch—a needle, with a hook at the point like the crochet-needle, is passed through the material, the thread placed in the hook; the hook is then withdrawn, carrying a loop of the thread through the fabric and through the previously formed loops, so as to interchain the several loops one with another (see fig. 2).

The Double-chain Stitch is formed with two threads. The upper thread is carried by an eye-pointed needle, which is passed through the fabric as in the lock-stitch machine, and also through a loop in the under thread, presented to it by the looper. The looper is of a curved form, having two eyes with a groove between them, in which the thread, supplied from a bobbin on the under side of the work-table, lies; and then an open loop is always supplied to the needle, which passes on the inside of the head of the looper. During the descent of the needle the looper is withdrawn in a circular direction, leaving a loop of its thread round the needle and the loop of the needle-thread, which is still tight against the needle. As the needle is withdrawn this loop, by the fric-

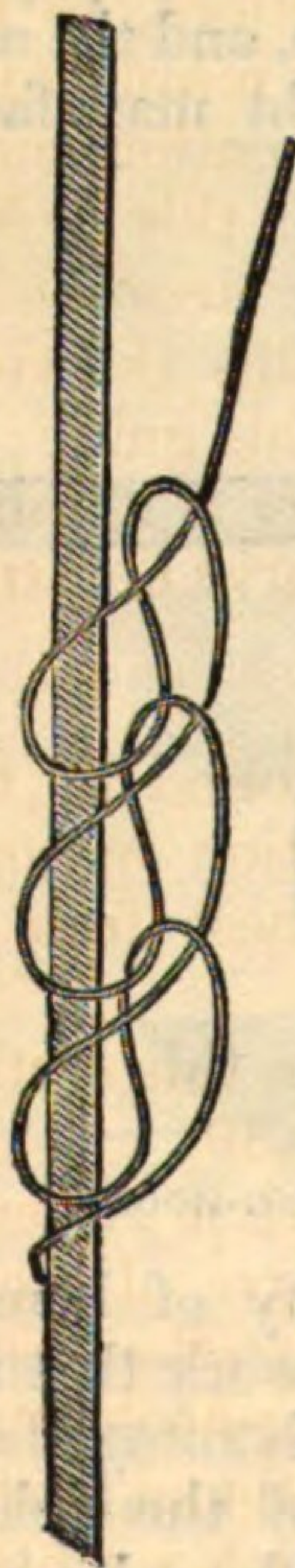


Fig. 1.
LOCK-STITCH.

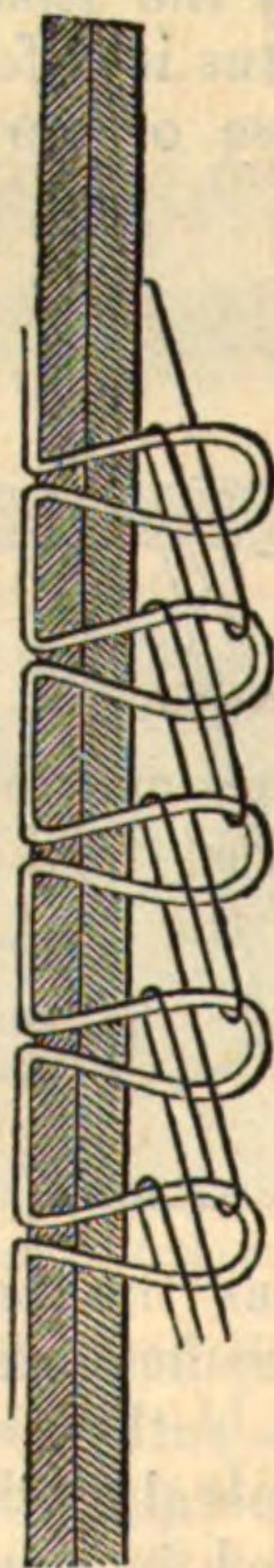


Fig. 2.
SINGLE-CHAIN
STITCH.

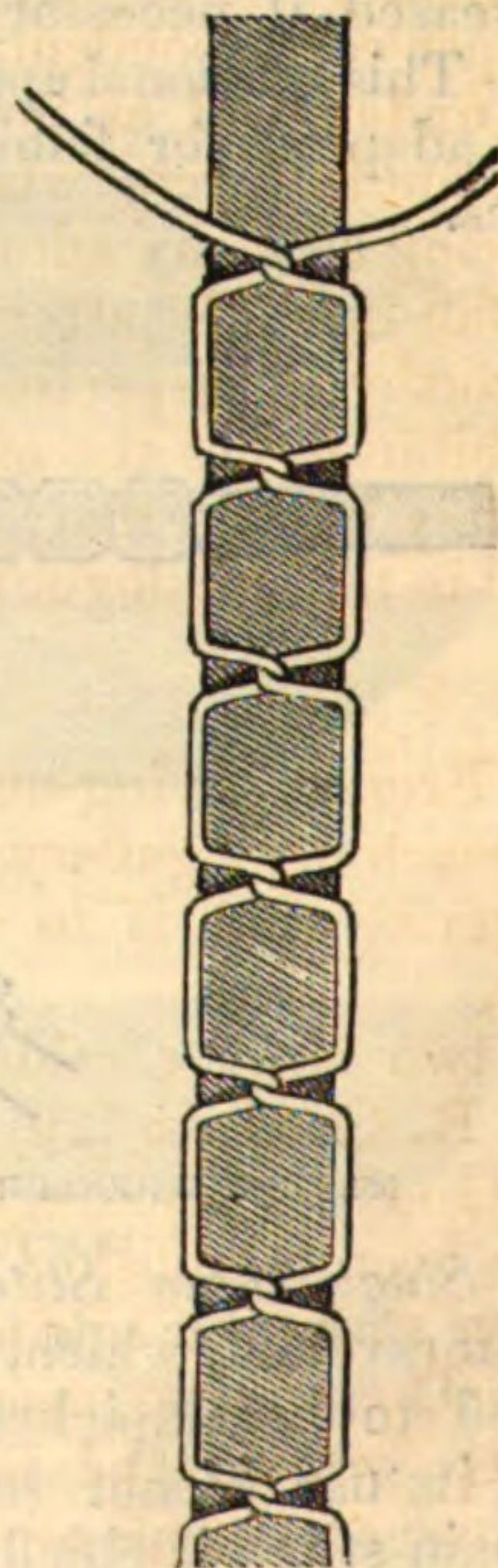


Fig. 3.
DOUBLE-CHAIN
STITCH.

tion of the thread with the fabric, bellies out, and before the eye of the needle has ascended above the point of the looper the latter returns and passes a loop of the under-thread through this needle-loop. This stitch is used chiefly in embroidery (see fig. 3 on preceding page).

Having now described the stitches used in the sewing-machines, and the method of their formation, I should like to go on to explain the way in which the machine itself is constructed and worked; but it would be impossible to do this in the limits of a report such as the present, and this is, fortunately, the less necessary, as readers who may desire to study the machinery and construction for themselves have only to purchase a very admirable translation of Dr. Herzberg's "*Sewing-Machine*," by Mr. Upfield Green, published by Messrs. Spon and Company, London, and illustrated with very carefully executed working drawings.

It now remains to point out the sewing-machines most worthy of attention in the present Exhibition—a task which, when done personally, as in the present instance, is not a little invidious. Unfortunately, the writer has neither the impersonality of a jury nor the anonymous position of a newspaper correspondent. He wishes, therefore, to be distinctly understood as not intending by any means to slight those manufacturers whom he does not mention, but that, there being so many admirable "exhibits" in this class, space would fail him if he attempted to point out or describe all that were worthy of inspection. To ascertain this the visitor to the Exhibition has the official catalogue as his guide; and it may safely be said that, if he has time, there is nothing put forward in this catalogue which does not deserve his attention.

Machines
exhibited.

FRANCE.

The French sewing-machines are to be found at the end of the machinery gallery nearest to the section appropriated to Algeria—that is to say, the end furthest from Great Britain.

France.

The two most considerable exhibitors in this section are Mr. C. R. Goodwin (29) and M. Callebant (30).

Mr. Goodwin's house, 29, is styled *La Maison Americaine*, and has been established in Paris eight years. He exhibits a greater variety of sewing-machines than any other establishment. The shuttle machine, the revolving-hook machine, both for forming the lock-stitch, may be found here. He also shows specimens of the double-chain-stitch machine, and the shoemaker's or wax-thread machine. All these machines are good of their kind. The cylinder or wax-thread machine may be seen in operation upon the soles of shoes. The price

CAPTAIN
HICHENS
ON
APPARATUS
FOR
SEWING, &c.

asked for an ordinary family lock-stitch machine is 350f.; but there is one specimen of a smaller foot-working machine at 250f.

M. Callebant, 30, confines himself entirely to the manufacture of the shuttle lock-stitch machine. His machines are admirable in construction and finish. Those machines with the top motion feed leave nothing to be desired, except a reduction in price; they cost 350f. Both these houses have received several medals for their sewing-machines.

MM. Brassard, Frères, 48, exhibit some very admirable cylinder machines for sewing the uppers of boots, &c.

M. Marc Klotz, 10, exhibits several machines with shuttles adapted to the reception of his thread cartouches already described, and of which a diagram is given above. His prices are low.

ENGLAND.

England.

The English sewing-machines will be found in the machinery gallery, at the end nearest the French section, quite close to the great entrance. Among the English contributors Messrs. Thomas and Co. (10) are the most conspicuous. They have a very fine sail-sewing-machine, which is well worthy of inspection. All the machines exhibited by them are of excellent workmanship and very solid in construction. Their lock-stitch machines all work with the shuttle, and it is impossible to find anything better adapted to manufacturing purposes.

The order of merit of the British exhibitors, as decided by the international jury, is as follows:—1. The Wanzer Sewing-machine Company. 2. Messrs. Thomas and Co. 3. R. S. Simpson and Co. 4. R. B. Turner (not in the catalogue). 5. Messrs. Newton, Wilson, and Co. 6. Messrs. Pitt Brothers. 7. Mr. James M. Clements. The machines of all these manufacturers are well finished and carefully made. The prices are, as a rule, lower than those asked by the French exhibitors.

AMERICA.

America.

There is a very admirable display of American sewing-machines. They will be found in an annexe in the park, nearly opposite to the American refreshment-room.

The most remarkable machine in this Exhibition is a new button-hole machine exhibited by the Union Button-hole Company (4), which succeeds in sewing the button-hole all round in precisely the same manner as when done by hand. This machine is well worthy of inspection.

Messrs. Wheeler and Wilson, 3, show many very admirable machines, and have in no way lost their high position as

manufacturers of sewing-machines. Their lock-stitch machines work with the revolving hook instead of the shuttle; they are very beautifully finished, and work easily and with very little noise. No machines can be better adapted to family use.

Mr. Houghton, 21, exhibits a machine for sewing the soles of boots, &c.

Mr. Crosby, of Boston, 22, has a cylinder machine for sewing the upper leathers of boots and shoes.

The sewing-machine may almost be regarded as an American specialty, and the number and beauty of the machines now exhibited do full justice to the manufacturers of that country.

PRUSSIA.

Messrs. Pollack, Schmidt, and Co. (not in the catalogue) exhibit a number of machines forming the lock-stitch, some with the shuttle and others on the Wheeler and Wilson principle, with the rotating hook. The machines are good and well finished—some of them, mounted very beautifully in walnut-wood cases, having the appearance when shut of a lady's writing-table. They also have some excellent specimens of all kinds of work, and complete cases of the different guides.

Prussia.

Messrs. Bruchner have some small foot-working machines, neatly finished, and apparently of good workmanship, for the very low price of 95f.

BELGIUM.

Of the four exhibitors named in the catalogue, only one (H. J. Petit, of Brussels) has sent machines.

Belgium.

CANADA.

The machines exhibited by Canada are very highly creditable to the rising industry of that important colony. No less than five different towns—Toronto, Belleville, Guelph, Hamilton, and Montreal—contribute exhibits in this class. The machines are on the American patterns, and do not seem to call for separate notice.

OTHER MACHINES.

In the two other divisions of this class—machines employed in the manufacture of boots and shoes and those used in the making of hats—there is nothing very remarkable or new to notice, the Exhibition, except in France, being very meagre indeed.

Other
machines.

In the French gallery the visitor may see the whole manufacture of felt hats. The process of making the felt is

CAPTAIN
HICHENS
ON
APPARATUS
FOR
SEWING, &c.

interesting. The fur, after being passed between rollers, is driven out through a funnel by a rapidly revolving fan on to a revolving perforated brass cone, from under which the air is exhausted, and upon which, consequently, the felt is held down by atmospheric pressure. It is thus sufficiently consolidated to be able to undergo the subsequent operations, all of which, up to the tying of the last ribbon on the hat, may be seen at the exhibit of M. Haas (12). The machine used in the manufacture of the felt is made and exhibited by M. Coq, Fils. Just on the opposite side of the French machine gallery the whole operations of the manufacture of boots by machinery may be seen.

There are, besides, some few exhibits which cannot well come under any of the three main groups into which Class 57 is divided. For instance, M. Thirion (3), in the French section, exhibits brass busts on which corsets are to be made. M. Chevard (17) has a mechanical arrangement for taking measures for coats, shirts, &c. In the English section Mr. Sparks Hall exhibits an upright shoemaker's bench, from which he expects the trade to derive enormous benefit to its moral and physical condition. In his pamphlet of some twenty pages in which his invention is described, and where many pleasant anecdotes of great shoemakers may be found, Mr. Sparks Hall winds up as follows:—"Among these
" means (of improving and preserving health) I feel sure that
" my invention occupies no unimportant place; I therefore
" earnestly invite you to avail yourselves of it, hoping that
" it may become a widely-extended benefit and a help
" towards improving the physical and moral condition of
" shoemakers generally, but especially of the rising genera-
" tion, to whom I look with some hope for an industrious,
" intelligent, and *upright* race of tradesmen.

"PRICE:—

" The bench complete, with drawers	- £2	0	0
Ditto without drawers	-	1	5 0"

One pound five shillings is certainly not a long price to pay for a *mens sana in corpore sano*, and I sincerely hope that Mr. Sparks Hall's anticipations may be realized. There is no doubt that the cramped position in which shoemakers generally work is very injurious to health, and the upright bench appears to furnish the means of working in a more convenient posture.

REPORT ON CARRIAGES and WHEELWRIGHTS' WORK.—
(Class 61.)—By GEORGE N. HOOPER, Esq.

MR.
HOOPER
ON
CARRIAGES,
&c.

IN drawing up a report on the carriages of the Paris Exhibition of 1867, it is hardly necessary to give a lengthened history of the art of the carriage builder in past ages. What is more important is to mark the present position of the trade, and the changes and improvements that have taken place in various countries, and if possible to endeavour to give some hints that may lead to a still higher perfection.

The art of carriage building dates from a very remote antiquity, and if any credit belongs to those whose long line of predecessors have by assisting intercommunication rendered service in advancing civilization, the coach builders are fairly entitled to credit for valuable services so rendered.

Short his-
tory of
carriage
building.

We have reliable information in the sacred writings concerning the use of chariots by the Israelites, Egyptians, Assyrians, and other nations of antiquity, and as most of these were for purposes of war, they must of necessity have been made sound and strong to sustain the wear and tear of distant expeditions, and doubtless, they were ornamented in a manner that accorded with the style of art pertaining to the period.

Under the Romans, if not under the Greeks, the art had a higher development, as it is well known that the former people established good carriage roads through a great part of the countries they conquered, which were served with regular posts. Despatches and letters were conveyed with great speed and punctuality to the most distant parts of their vast empire.

Suetonius (De Aug. xlix.) mentions that the Emperor Augustus established on the military roads, at first active young men, and afterwards carriages to convey his despatches to his provincial governors. Subsequently, his successors organized the system over a great part of the Roman empire.

* The following were the carriages used by the Romans:—

The Cisium, a gig or light open carriage for one horse kept for hire at the post stations along the great roads.

The Currus, a chariot or car, a two-wheeled vehicle, open overhead, and thus differing from the carpentem, was com-

* Smith's Dictionary, pp. 242, 288, 378, 379, 994.

MR.
HOOPER
ON
CARRIAGES,
&C.

monly drawn by two horses and then called bigæ, if with three horses trigæ, and if with four horses quadrigæ.

The post carriages were called carpenta and rhedæ, and were drawn by eight horses or mules. The invasions of the barbarians destroyed the whole system of Roman posts.

Early British history* presents to our view the *essida* or *essidum* (from the Celtic *ess*, a carriage), the name of a war chariot used by the Britons, Gauls, Belgæ and Germans, open in front and with the pole wide enough to walk upon. There were about 4000 of these in the army of Cassibelanus. (Cæsar, *Bel. Gal.* v. 19.)

These carriages were copied or adapted by the Romans for purposes of luxury and convenience, and were kept at the post stations for hire.

After the dissolution of the Roman empire the art seems to have fallen into disuse and was at length lost: It was, however, revived by the Italians, Spaniards, French and English in the 16th century. It is fortunate that some of the carriages of each country have been preserved to give an idea of the art as it was then practised. In England (1669) King Charles II. granted a charter incorporating The Worshipful Company of Coach and Coach-harness Makers in the city of London, conferring on them certain privileges and rights in order to encourage and protect a trade that had not been very long established, and was thought to require support. The company still exists, and in February 1865 granted the use of its hall for the purpose of enabling the carriage workmen of London to hold an exhibition of their handicraft, at the same time rewarding the most skilful with handsome bronze medals.†

The Coach-
makers'
Company of
the city of
London.

As to the
suitability
of the Ex-
hibition
building.

In considering the carriages of the Exhibition, it may be well first to notice the building that contains them. The great building in the Champ de Mars can hardly be compared with a permanent building, and indeed has no pretension to one, it being in reality an immense repository for the goods it contains. In many respects it answers its purpose admirably.

For geographical arrangement and classification its zoned form was most convenient, and persons wishing to visit and compare any particular class of goods of several countries were enabled to do so without difficulty.

* Smith's Dictionary, p. 476.

† The company has also made a grant of money as prizes for successful candidates in "applied mechanics" and in "free-hand drawing" at the examinations of the Society of Arts.

The chief advantage of the original plan would seem, however, to have been overlooked in the separate buildings and annexes in the park, and, in the opinion of many, the Exhibition building itself was open to the serious defect that from no part could a really fine perspective view be had.

MR.
HOOPER
ON
CARRIAGES,
&c.
—

The carriage department for each country was intended to be in the great outer zone of the main building, among the machinery, but although the French, English, Prussian, Austrian, Italian, Dutch, Canadian, and Roman carriages will be found there, the carriages of Russia, Belgium, Switzerland, the United States of America, Norway, and some belonging to France will be found in the annexes of their various countries.

Where the
carriages
are to be
found.

The carriage class has on this occasion received much more consideration for its wants than at any previous French exhibition, and if the foreign carriages are not quite so well shown as the French ones, they, at any rate, have a very liberal allowance of space, and are much better placed than any of the foreign carriages at the two London exhibitions of 1851 and 1862, and the Paris exhibition of 1855. On account of the shape of the space allotted to the French carriages this year at Paris, their position and arrangement hardly show them to such advantage as the English carriages in the London Exhibition of 1862, where they were placed obliquely in long rows, so that it was possible at a short distance better to judge of their style and merits only, and the light so fell on them as to show to advantage the brilliancy of the varnish. The English carriage-builders on that occasion subscribed among themselves to provide suitable fittings to the department, and rendered it very attractive to visitors. Their example has on this occasion been followed by the French carriage exhibitors, who have laid down neat floorcloth over the whole carriage department, and enclosed it with ornamental iron standards, supporting handsome crimson covered ropes. This, together with the building of a carriage annex for the carriages and detached parts that could not be received into the main building, is said to have cost the French carriage exhibitors, together with the space they occupy, about 10*l.* sterling per carriage. It would seem that each country has the opportunity of exhibiting its goods best on its own territory, where arrangements are more easily made for their proper display. The carriages from England have, unfortunately for them, got entangled with the locomotives, and this somewhat detracts from the pleasing effect that the department should have in order to attract visitors.

The mode
of display-
ing the car-
riages.

MR.
HOOPER
ON
CARRIAGES,
&C.

The manner
of collecting
the British
carriages.

The manner of collecting the English carriages differed essentially from the French. After applications had been received from all who chose to apply for space, the proposed London exhibitors were called together at the rooms of the Society of Arts, where they elected a committee representing as far as possible each interest in the trade, which was rather a committee for distributing space than for selection of exhibitors; for, no applicant was refused space, and in no instance was space for more than two carriages allotted to one firm. The provincial coach-builders were provided with space by the local committees, and in only one case was space for three carriages allotted.

No charge has been made to British exhibitors for the space they occupy, the expense being borne by the British Commission, and no expense has been incurred by the British carriage exhibitors in rendering their department more attractive to visitors; and it is for them to judge how far a small expense would have been desirable to attain the end that all exhibitors aim at.

It would be ridiculous to suppose that England could not have shown a much better collection of carriages. The department presents an illustration of the free institutions of England, and is really an "all comer's meeting." It shows the liberal feeling, if not the discernment of the space committee.

The French carriages were collected on a totally opposite system. The first step was the nomination by the Imperial Commission of a committee of selection, composed of two Paris coach-builders of high standing, to represent private carriages, and the manager of the Paris General Omnibus Company to represent carriages for the public service.

The manner
of collecting
the French
carriages.

Five of the principal firms of Paris coach-builders had each of them space for four carriages allotted in good positions. This at once secured 20 good carriages, and space was allotted according as it was judged that the applicants would best sustain the reputation of their country, all those whose productions were likely to render the department a mere bazaar being rigidly excluded. Thus it will be seen that the French carriages, even before admission, had passed a severe ordeal. This almost exclusive plan has secured a number of good carriages by several coach-builders, who had never before sent carriages to exhibitions, partly because of the very mixed character of former displays, and partly because no practical coach-builder, French or foreign, had ever before been nominated to act on the French carriage juries.

British public opinion would hardly allow a similar mode of proceeding, but the French display of carriages justifies the

French method, and will probably be of more benefit to the whole carriage-building trade of France, than if a large number of inferior carriages had been admitted, preventing the display of many superior ones, and depriving masters and workmen alike of the opportunity of examining and studying many good specimens of carriage building.

Allowance must be made for those British carriage-builders who have not cared to be represented by their productions in Paris. Periodical exhibitions are very heavy taxes on manufacturers; but the anxiety, worry, and hindrance to ordinary business which they entail are not felt by the general public.

It appears to be almost impossible to get together in any exhibition the very highest types and best specimens of British carriages. These may be seen best on occasions when Her Majesty holds courts or drawing rooms at one of the London palaces. On such occasions, the dress chariots, landaus, and coaches of the Queen, royal family, and British nobility are seen to the best advantage.

Difficulty
of collecting
in an exhibi-
tion the
highest
types of
British car-
riages.

The composition of the jury next demands attention. This is a matter which affects the interests of the exhibitors in a very decided manner, and it is not surprising that it is one on which they feel very strongly, it being of great importance that the jury should be composed in a manner that satisfies the great majority of exhibitors. Those who send their productions to exhibitions place their reputation and credit in the hands of the jury, and as there is practically no appeal from their decisions, the members of the jury accept a heavy responsibility in the awards they make. It is hoped that no jury ever knowingly places an exhibitor in a position other than that which he should in strict justice occupy; but if from want of special knowledge of the department they examine, exhibitors are not placed in their true relative positions, the injury is the same. On the other hand jurors have to be very cautious that they are not led into error by the mere name of an exhibitor who cannot sustain the relative position acquired by his predecessor, and is surpassed by an exhibitor previously less known, but whose talent and perseverance have brought his productions to a greater perfection.

The com-
position of
the jury for
carriages.

The carriage jury of 1867 is thus composed:—

A Paris-coach builder represents the interests of the builders of French private carriages.

The manager of the *Compagnie Générale des Omnibus de Paris*, represents carriages for the public service.

MR.
HOOPER
ON
CARRIAGES,
&c.
—

The mode
of selecting
the British
jurors.

A German coach-builder represents German and foreign interests.

A British coach-builder represents British and foreign interests.

The selection of British and foreign jurors was conducted on different principles. In England the selection in Class 61 and probably in others was made by the exhibitors subject to the approval of the Commission, each exhibitor being furnished with a printed paper on which he was requested to name such persons as he considered suitable for the office. The French and foreign jurors were nominated by their respective Commissions without such concurrence of the exhibitors.

As regards the qualifications of the jury, it would be difficult to fix upon a better mode of representing all interests among the carriage exhibitors. However, they must be judged ultimately by the list of awards. It is said by some of the French carriage exhibitors that the carriage department has never been so thoroughly examined on any previous occasion, and most certainly it cannot be denied that Class Jury 61 worked incessantly at the examination in the very limited time allowed them, and besides had personal interviews with and explanations from a great number of the French, British, and foreign exhibitors, so as to satisfy as many of them as possible that their productions were not overlooked.

The public and exhibitors should not, as they did at the London Exhibition of 1862, rely exclusively on the decision of the class jury that has examined the carriages, as the awards were subject to the revision of two superior councils, the group juries (formed of the presidents and reporters of all the class juries of the group), and the Imperial Commission.

The tri-
bunals of
class juries,
group juries,
and Imperial
Commission.

However perfect in theory such a series of tribunals may be as regards the strict accuracy and justice of their decisions, the practical result is, that by extending the proceedings and discussions over many weeks, most of the foreign jurors had left Paris, so that the ultimate decisions rested almost entirely with the French members of the group juries, and the Imperial Commission. Whatever may be the proportion of medals and awards allotted to France, foreigners will (whether rightly or wrongly) think that they have been augmented in the absence of the foreign jurors. Experience seems to show that foreign jurors cannot be kept together more than three weeks or a month at the utmost, they being generally selected from persons who are actively engaged in occupations which cannot be neglected for a longer time, and, in order to satisfy them that they are treated with

perfect fairness, arrangements should be made to conclude the decisions while they are able to be present, if indeed it would not be still better to treat as final the awards of the class juries. The proceedings of the group juries occupy a great deal of valuable time, and the decisions much depend on whether the presidents and reporters vigorously and cleverly advocate the claims of those they recommend. A little want of tact may lose for their class that which it is justly entitled to.

MR.
HOOPER
ON
CARRIAGES,
&c.

The perils
of exhibi-
tors in the
group jury.

When it is considered that in voting the medals in the group which includes carriages (and which group also included such a variety of subjects, as processes of the art of mining, agricultural apparatus, shooting and fishing implements, apparatus used in chemistry, steam engines, and machines of all kinds, railway apparatus, telegraphic apparatus, civil engineering, public works, and architecture, navigation, life-boats, &c., &c.), the two carriage-jury votes were of equal value with any others in decisions on the merits of all the subjects comprised in that group, and that the jurors for all the subjects other than carriages in like manner gave their votes for or against the recommendations of the class jury for carriages, it will be understood how singular and uncertain an ordeal has to be passed by the successful exhibitors.

The charac-
ter of the
decisions of
the group
jury, and
their uncer-
tainty.

At the Paris Exhibition of 1855, the jury entrusted to examine the carriages was composed of ten members. The juror who from his occupation had most technical knowledge of carriages was manager of the company of the Messageries Générales, and the other members were gentlemen all celebrated in their several professions; but the mistake then was in placing the carriage department in the hands of any jury not including one or more practical coach-builders as jurors or associate jurors to advise on the decisions. The British juror, on that occasion, the late Marquis of Lansdowne (then Earl of Shelbourne), on his return to London, stated that he very much regretted that the Imperial Commission had not provided such assistance to the jury.

Composition
of the car-
riage jury
of 1855.

In the French report of Class 6 (carriages) at the London Exhibition of 1862,* General Morin has fallen into a slight error in comparing the speed at which passengers and mails were conveyed in France and England immediately previous to the time when railways in both countries superseded the use of malle-postes, diligences, and mail and stage coaches.

Reference to
the French
official
report on
the car-
riages in
the London
Exhibition
of 1862.

* pp. 410, 411.

MR.
HOOPER
ON
CARRIAGES,
&c.

Speaking of the French service, he notices the great acceleration of speed that had been at last obtained, and “that the malle-poste between Paris and Brussels was timed to be accomplished at the rate of from 15 to 16 kilometres per hour, but that at such a speed the wheels of the carriages were rapidly destroyed, the horses suffered intensely, especially in the organs of breathing, and that of a hundred horses purchased by the very intelligent and clever Paris postmaster, M. Dailly, senr. there were rarely found more than five or six that were fit for such work,” and that the postilions had called it “travelling by steam.” And he further adds that “the English mails of which they (the English) had long boasted the speed, were at that time far surpassed by ours, and travelled at the utmost from 12 to 14 kilometres per hour, in spite of the brilliant appearance of their four horses, and the unvarying dignity of the coachman.”

If the general had ever travelled in England in a good mail or stage coach he could hardly have fallen into an error, which is so easily corrected from official documents in England.

On referring to the General Post-office in London, a tabulated statement of the speed at which all the mails were conveyed in the years 1835 and 1836 has been searched, with the following results:—

The speed of conveyance of the mails (by mail coach) in England and France compared.

The mails between Liverpool and Preston were conveyed at the rate of 10 miles 5 furlongs per hour, equal to $17\frac{1}{10}$ kilometres per hour (17 kilometres 109 metres).

Between Carlisle and Glasgow, at 10 miles 4 furlongs per hour, equal to $16\frac{9}{10}$ kilometres per hour (16 kilometres 910 metres).

Between London and Devonport, at 10 miles 3 furlongs per hour, equal to $16\frac{3}{4}$ kilometres per hour (16 kilometres 708 metres).

Between London and Bristol,

„ Gloucester and Carmarthen, at 10 miles 2 furlongs per hour, equal to $16\frac{1}{2}$ kilometres per hour (16 kilometres 506 metres).

Between London and Holyhead,

„ „ and Birmingham,

„ „ and Liverpool,

„ „ and Manchester,

at 10 miles 1 furlong per hour, equal to $16\frac{1}{3}$ kilometres per hour (16 kilometres 304 metres).

Between Birmingham and Sheffield,

„ Pontefract and Leeds,

Between London and Bath,
 „ York and Edinborough,
 „ London and Halifax,
 at 10 miles per hour, equal to $16\frac{1}{10}$ kilometres per hour
 (16 kilometres 103 metres).

MR.
 HOOPER
 ON
 CARRIAGES,
 &c.

These extracts from the old books of the London General Post Office (drawn up for the information of the authorities in 1835 and 1836) are sufficient to show that the public mail service in England was not surpassed by the French, and that what is set down as a “boast” on the part of the English was merely a statement of fact.

The books of
 the British
 General
 Post Office
 searched.

At the same time private enterprise carried on a successful competition with the Government in the conveyance of passengers, and many of the stage coaches surpassed the mail coaches in speed.

To such perfection had every arrangement been carried, and such was the punctuality of the completion of the journey, that it has been known that in journeys of 170 miles the time of arrival of the coach has for several days consecutively only varied by five minutes.

The “unvarying dignity of the coachman” is amusing as applied by a Frenchman to a mail or stage coachman of the olden time in England. These men were the “life of the road.” The English coachman was almost invariably a hearty cheerful fellow, full of anecdote, fond of a chat, proud of his coach and of his horses, and willing to impart information to travellers as to any object of interest on the road. He frequently owned a share in the coach and horses he drove, was an “artist” in his craft, managed his high mettled team with great skill and courage, was full of resources in case of accidents, and was a sort of father to timid, nervous, and young persons when placed under his care. His skill was such that he would drive over a line of small coins placed along the road without missing one of them, and the seat next to him on the box was considered the “seat of honour,” frequently reserved several days beforehand by gentlemen who wished to render their journey agreeable. He was in addition a “professor” of his art, and many were the noblemen and gentlemen who learned the art of driving four horses under his tuition, and handsomely rewarded him for teaching them.

The driver
 of an Eng-
 lish mail
 coach.

Compare such a man with the “cocher” of a French diligence. The individual in the latter case was a “peasant,” who generally brought his horses out of their stable and harnessed them himself, and then mounting his solitary seat at a distance from the passengers, proceeded to “get along” by

The driver
 of a French
 diligence.

MR.
HOOPER
ON
CARRIAGES,
&c.
—

a loud cracking of his whip, sometimes with one, at other times with both hands, taking charge of the reins in the meantime by sitting on them, his costume a blue linen blouse and trousers, his conversation addressed only to his horses; and having driven them a stage onwards, he withdraws to make room for a similar "knight of the whip."

Impartial judges of travelling in both countries will know how to decide this point; and if the large number of English coachmen, grooms, jockeys, and men having a special knowledge of horses, holding service in France, is any proof of the esteem they are held in abroad, it looks like a candid admission that France had much to learn from England on these points, and has already taken steps to improve.

The English
"stage
coach."

The first great merits of the English mail coaches were their lightness, compactness, and the height of their wheels; their weight was from half to two thirds that of the French diligences; the interiors of both were very similar, except that the English usually carried four, and the French six passengers. The great difference was the number of outside passengers carried on the English system. The English have a great delight in fresh air, and much prefer to breathe the pure air, than to be enclosed with a number of other persons by which the air must necessarily become impure.

Women were generally conveyed in the interior except in fine weather, when they frequently occupied outside seats, being helped up and down with convenient ladders kept at the post houses for the purpose. In cold or bad weather the outside passengers were well supplied with thick coats and wrappers, and protected from the rain with umbrellas. At the inns and hotels on the road, comfortable breakfasts, dinners, teas, and suppers were provided ready for the passengers the moment the coach stopped at its appointed place for refreshments.

However, the English mail coaches would hardly have been suitable for all parts of France, as on the journeys from Paris to Bayonne, Marseilles, or Toulon, when it would be necessary to pass two, three, and even four nights on the road. The continued exposure of the passengers to night air in winter could not have been endured, and possibly the continued exposure to the sun in summer would have been equally objectionable.

Good roads
were essen-
tial for the
success of
the English
stage coach.

In conclusion the English coaches required good roads; and France had not such roads at the time referred to and could not consequently have used English mail coaches, even if she had possessed them.

Now that the streets of Paris have been improved, and the narrow crooked streets of old Paris are being superseded by the handsome, straight, and beautiful streets and boulevards of Imperial Paris, English "drags" are being used with as much safety and comfort as in London. Two English firms have placed specimens of such carriages in the Exhibition of 1867, which may still further develop their use; and a French firm contributes one specimen well calculated to show how readily French coach-builders can produce an article of a totally different type to those they are accustomed to, should there be any demand for it from their Paris customers.

MR.
HOOPER
ON
CARRIAGES,
&c.
—
English
"drags" can
now be
driven in
the new and
wide streets
of Paris.

The carriages exhibited may be thus classified:—

Statistics
of the car-
riages exhi-
bited.

—	French.	British.	Other Countries.	Total.
1. Phaetons - - -	12	6	16	34
2. Landaus - - -	13	9	8	30
3. Broughams - - -	14	6	8	28
4. Barouches - - -	6	13	7	26
5. Two-wheel carriages -	2	5	4	11
6. Brakes and waggonettes	3	5	—	8
7. Private omnibuses -	5	1	1	7
8. Sledges - - -	—	2	3	5
9. Chariots - - -	4	—	—	4
10. Public omnibuses -	4	—	—	4
11. Drags - - -	1	2	—	3
12. Coaches - - -	2	—	1	3
13. Droskis - - -	—	—	3	3
14. Travelling carriages -	—	—	2	2
15. Sociables - - -	1	1	—	2
	67	50	53	170

French	-	-	-	67
Foreign	-	-	-	103
Total	-	-	-	170

Six carriages were withdrawn from competition for rewards, four French and two English, in consequence of two of the jurors being members of the firms that exhibit them, namely,—

Numbers 7, 8, 14, 15, France; "dress chariot," "barouche," "brougham," "phaeton," exhibited by "Binder, frères," Paris.

Number 14, Great Britain; "drag," "barouche," exhibited by "Hooper & Co.," London.

Carriages
exhibited
by Binder,
frères, Paris,
and Hooper
and Co.,
London,
withdrawn
from com-
petition for
medals, and
the reason.

MR.
HOOPER
ON
CARRIAGES,
&c.

Statistics of
exhibitors.

Carriages for private use and sledges; also carriages for the public service.

Analysis of exhibitors and contributions.

Locality.	Exhibitors.	Carriages.
France :		
Paris, (private carriage) - - -	32	55
Paris, (public) - - -	4	4
Provincial - - -	8	8
	44	67
Great Britain:		
London - - -	15	24
Provincial - - -	16	21
Colonial - - -	3	5
	34	50
Russia - - -	8	12
Belgium - - -	6	11
Prussia - - -	5	6
Holland - - -	4	6
Italy - - -	3	4
Norway - - -	4	4
United States - - -	2	3
Rome - - -	1	2
Austria - - -	2	2
Switzerland - - -	1	2
Tunis - - -	1	1
	115	170

The number of exhibitors of the following are:—

	French.	British.	Other Countries.	Total.
Full size working drawings of carriages - - -	2	—	—	2
Small carriage drawings "to scale" - - -	2	3	—	5
Printed books relating to carriage building - - -	2	—	—	2
Carriage wheels - - -	5	5	—	10
" axles - - -	10	1	2	13
" springs - - -	3	—	1	4
" ironmongery - - -	5	—	—	5
" interior leather fittings - - -	1	—	—	1
" spring seats - - -	1	—	—	1
" cane work imitation - - -	1	—	—	1
" chasing - - -	1	—	—	1
" models - - -	—	1	—	1
" improved hinges - - -	—	1	—	1
" bent timber - - -	—	2	—	2
Perambulators - - -	2	1	—	3
Invalid chairs - - -				
Velocipedes - - -				
	35	14	3	52

As several exhibitors show articles under several headings, the numbers appear greater than they really are. Thus the French exhibitors really number 27; British 9, Colonial British 3=12; other countries 2; 41 in all.

MR.
HOOPER
ON
CARRIAGES,
&c.

	Exhibitors	Exhibitors (jurors) who there- fore with- drew from Competition for Medals.	Gold Medals.	Silver Medals.	Bronze Medals.	Honorable mention.
France - -	71	1	3	13	16	19
Great Britain -	46	1	1	11	11	6
Russia - -	8	—	—	2	2	2
Prussia - -	5	—	—	—	2	—
Belgium - -	6	—	—	1	—	3
United States -	2	—	—	2	—	1
Italy - -	3	—	—	—	2	—
Austria - -	2	—	—	—	1	—
Switzerland -	1	—	—	—	1	—
Rome - -	1	—	—	1	—	—
Holland - -	4	—	—	—	1	—
Hesse - -	1	—	—	1	—	—
Sweden - -	1	—	—	—	—	1
Norway - -	4	—	—	—	—	1
Tunis - -	1	—	—	—	—	—
	156	2	4	31	36	33

CO-OPERATORS.

France - -	—	—	—	3	3	7
Great Britain -	—	—	—	—	1	6
	—	—	—	3	4	13

Having cursorily considered the foregoing topics, it is now time to pass on to the consideration more in detail of the carriages themselves. A glance at the accompanying tables of statistics will show that they numbered 170, contributed by 115 exhibitors of various countries:—

67 being French, by 44 exhibitors.

50 being British, by 34 exhibitors.

53 being of 11 other foreign countries by 37 exhibitors.

On examining the figures in the tables closely, several singular facts are arrived at. On the French side, out of 67 carriages shown, 59 are contributions from Paris by 36 exhibitors, and eight only from all the French provinces by eight exhibitors. Truly, therefore, in this class, Paris represents France! But considering that many good carriages are made at Boulogne-sur-mer, Colmar, Bordeaux, Lille, and probably at such large cities as Marseilles, Lyons, Nantes, Rouen,

Singular re-
sults shown
by exami-
nation of
statistics.

MR.
HOOPER
ON
CARRIAGES,
&c.
—

Toulon, and Caen, it seems strange that so few productions from the French provinces, are to be found in the Exhibition.

On the British side, out of 50 carriages, 24 are from London, by 15 exhibitors; 21 are from the provinces, by 16 exhibitors; and 5 are Colonial, from 3 exhibitors; so that London only sends three more carriages than the provinces, and the latter out-numbered London by one exhibitor; whereas the carriages from Paris are more than seven times as numerous as those from the French provinces. Whether the proportion of Parisian and provincial carriages was pre-arranged in order to make a good assemblage, and thus to influence the number of awards to France, or was a matter of chance, the figures brought out by the statistics disclose at any rate a singular disparity in the conditions of display between France and England.

It will be noticed that the number of carriages from all other foreign states together only slightly out-numbered those from Great Britain, being respectively 53 and 50; but if to the latter, be added several carriages that arrived from Canada after the dispersion of the class jury, the numbers are as nearly equal as possible.

The number of carriages at the London Exhibition of 1862 was 140, being 91 British, 11 French, and 38 from 11 other states; so that the number of British carriages sent to the present Exhibition is nearly five times as great as those sent by France to the London Exhibition of 1862.

Great
variety of
national
carriages.

There is another fact worthy of notice as regards the type of carriages shown by various states. The spirit of "nationality" seems to have found its exponent among the carriages, and there are more carriages in the present exhibition exemplifying this characteristic than at any former one. This is a good sign, showing as it does some pride and love of country, and a willingness to compare with others, and probably to adopt improvements where comparison shows that they are required. This remark holds good with private carriages only, for from France alone are there contributions of carriages for the public service. Indeed, so great seems to be the difficulty of getting together for comparison the public carriages of the various European states, that it is well worthy of consideration whether a special exhibition of such conveyances, with suitable rewards for their improvements, might not with advantage be held in one of the European capitals. It is a public question, and one in which many millions of travellers are interested.

No foreign
competition
in carriages
for the pub-
lic service.

As regards most kinds of modern carriages, there is little difficulty in ascertaining the country in which they had their

origin; but with some few there are doubts. The following list, if not quite accurate, is believed to be nearly so:—

MR.
HOOPER
ON
CARRIAGES,
&c.
—
Origin of
various
carriages.

Coach - - -	Kotze, Berlin -	Hungary or Prussia.
Chariot - - -	Coupé - - -	France.
Barouche - - -	Calèche - - -	"
Britzska - - -	Britzska - - -	Austria.
Droski - - -	Droitzska - - -	Germany and Russia.
Cabriolet - - -	Cabriolet - - -	France.
Cab phaeton - - -	Milord or Victoria	England.
Mail phaeton - - -	Mail phaeton - - -	"
Gig and Tilbury - - -	Tilbury - - -	"
Curricie - - -	Curricie - - -	Italy.
Landau - - -	Landau - - -	Germany.
Fourgon - - -	Fourgon - - -	France.
Dog-cart - - -	To-car - - -	England.
Omnibus - - -	Omnibus - - -	An Englishman named Shillibeer, in France.
Drag - - -	Malle-Anglaise - - -	England.
Park phaeton - - -	Phaeton de parc - - -	"
Brougham - - -	Petit coupé - - -	"
		(Lord Brougham).
Double Broughams - }	Clarence - - -	England.
Clarences - - - }		
Wagonette - - -	Wagonette - - -	"
Sociable - - -	Sociable - - -	"
T-cart - - -	T-cart - - -	"
Sociable-landau - - -	- - -	"
Basket carriage - - -	Panier-à-salade - - -	"
Britzska-chariot - - -	Eilwagen - - -	Germany.
Spider phaeton - - -	- - -	America.
Rockaway - - -	- - -	"
Char-à-coté - - -	- - -	Switzerland.
Tarantas - - -	Voiture de voyage - - -	Russia.
Kibitka - - -	- - -	"
Telega - - -	- - -	"
Troika - - -	- - -	"
Outside car on two or four wheels. - - -	- - -	Ireland.
Sledges - - -	- - -	Russia.
" - - -	- - -	Norway.
" - - -	- - -	Germany.
" - - -	- - -	America.
" - - -	- - -	Canada, &c. &c.
Carriole - - -	- - -	Norway.

From this list of original countries of manufacture—
France contributes chariots, barouches, cabriolets, omnibus.

MR.
HOOPER
ON
CARRIAGES,
&c.

Great Britain contributes dog-carts, drags, broughams, double-broughams, mail-phaetons, sociables, sociable-landaus, Irish-cars, Canadian sledges.

Russia contributes a "tarantas" for travelling in Siberia, droskies, sledges.

Norway contributes carriages, sledges.

Switzerland contributes a char-à-coté.

America contributes a spider-phaeton.

Each of these carriages has or had some speciality adapted either to the climate, state of the roads, or habits of the people where they were first contrived and used.

Thus the "sledges" were of course only used in cold climates, where they could travel over ice or snow.

The "tarantas" of Russia has great strength, compactness, and capacity for carrying luggage, provisions, and bedding, besides tools and spare parts to make good breakages and losses.

The "char-à-coté" of Switzerland is long, narrow, and light, and is well adapted for traversing the mountainous roads of that picturesque country.

The "carriage" of Norway is light, inexpensive, and doubtless well adapted for the simple wants of a primitive people in a mountainous and thinly inhabited country.

The "spider-phaeton" of America is said to be admirably adapted to the wants of the people of the United States and some of the Australian colonies. It is so light and elastic that it bends and gives way under usage that would break a stiffer and heavier carriage.

The "chariots" of France help to keep up the state and ceremony that appertain to an imperial court, in the midst of a magnificent city. Its "barouches" carry the gaily dressed ladies of Paris to the Bois de Boulogne on bright summer afternoons. Its "cabriolets" are now nearly obsolete, but will probably again soon come into use among the "*jeunes gens de Paris*," as they are elegant and stylish carriages for those who keep good horses and know how to drive well. The "omnibus" is a great institution in Paris, and must be treated of separately.

The English
"drags."

The "drags" from England are a never-ending attraction to crowds of admiring visitors, to a large proportion of whom they are an entire novelty; and of all "national" carriages they receive the most attention. Thanks to the French and British Commissions, they are very well placed near one of the large entrances. They are very characteristic of country life in England, where, as a rule, the pastimes and pleasures of the country are preferred to the gaiety and excitement of the towns. In England at the present time, however, such

MR.
HOOPER
ON
CARRIAGES,
&c.

carriages are used for driving in the London parks, for attending horse-races, for going to or from cricket matches, for pic-nics, and many other purposes connected with life at the mansions and country seats of the English nobility and gentry. As such carriages are very frequently taken considerable distances from home, and to places where it is difficult to procure suitable refreshment, a luncheon is on such occasions taken with the carriage; and it has been usual to spread it on a tablecloth placed on the grass, and for the company to sit round and partake of it. As the grass is frequently damp, and may not only be uncomfortable but dangerous to health, there is shown on one of the English drags an improved means for serving the luncheon with more comfort. This has been accomplished by means of making the boot doors and the sides of the front boot fall down and form tables. A folding mahogany table passes entirely through the body, projecting at the doors. The lunch, glass, plate, wine, &c. are all carried in suitable boxes, baskets, and ice-wells, neatly contrived so as not to interfere with the perfectly neat and gentlemanly appearance of the carriage; a point on which English gentlemen are extremely sensitive and particular.

The English "dog-carts" are essentially country carriages, and are nearly all made in the provinces. They are used for conveying sportsmen and their dogs on shooting expeditions, and are in general use throughout the country by gentlemen, farmers, and tradesmen.

The "broughams," first used by, and named after the celebrated Lord Chancellor Brougham, are more especially used in London and the English towns. Their use in the country has much increased of late years, as they are now built much lighter than formerly.

Lord
Chancellor
Brougham.

The "mail-phaetons" are much used by gentlemen who like driving their own horses both in London and in the country. It is the most convenient and suitable carriage for a gentleman to drive with a pair of horses.

The "sociables" are light open carriages for one or two horses. They are convenient of access with a single step, and, by reason of their lightness, for a time almost put out of use the barouches. Now that barouches have been improved, and their weight diminished, they are regaining quickly their place in public favour.

The "sociable-landaus" are a similar carriage to the "sociables," but with the addition of a landau top, enabling the carriage to be used in all weathers, and forming a comfortable open or close carriage at pleasure.

They were introduced eight or nine years ago in London, and have entirely superseded the heavy and cumbersome lan-

Improve-
ments in
landaus.

MR.
HOOPER
ON
CARRIAGES,
&c.

Their dis-
advantages.

daus of the past, which always required two large horses, and occasionally four when taken into the country. Such great public favour has been bestowed on these carriages that they are the staple manufacture of many British coach-builders. There are no less than 30 carriages of this type from various countries in the Exhibition, and although much more expensive, even out-number the broughams.

They have several disadvantages, as have all carriages that are made to serve several purposes. Their perfect action depends on the rigid nature of the iron or steel plates that secure the bottom framing of the body, and as this has always many angles or sharp turns, the form is not favourable for the work imposed on it. The slightest movement of parts interferes with the exact position of the doors, head, glasses, blinds, curtains, locks, &c., and rough usage increases the tendency to go wrong. The constant raising and lowering of the head also tends to the destruction of the leather, so that the cost of repairs is heavier in proportion than with other carriages. As a consequence, where economy is not a special object, many persons now prefer keeping two carriages, such as a light barouche and light family coach, which latter carriages having also recently been much improved in lightness and elegance.

"Irish cars" away from their native soil are an anomaly. Even the English do not understand and appreciate them, and much less can it be expected that foreigners will do so. They will carry four or five persons with luggage, and are so well balanced and so hung that a horse will do a long journey with little fatigue. Their use is universal throughout Ireland, and after a few drives strangers get accustomed to the position of the seats, which at first seem strange. The same principle of construction has been applied to cars on four wheels for two or four horses, and under the enterprise of Mr. Bianconi have done much to improve the communication between distant parts of Ireland.

The "Canadian" sledges most unfortunately arrived so late that the jury was prevented from examining them. The Canadians, however, have a great reputation for making such vehicles very comfortable, and they have doubtless done their best on this occasion.

The manner
of consider-
ing the re-
lative merits
of the
exhibited
carriages.

In examining the carriages of various countries as to their relative merits, the jury were guided by the following considerations, being those laid down by the London carriage jury of 1862, namely,—

1st. Their suitability for the purpose intended, giving comfortable accommodation to those who use the carriage.

2nd. Their good general design and proportion.

3rd. Their soundness and accuracy of workmanship, combined with good materials.

4th. Their improvement and novelty.

5th. Their construction, with a view that no part shall be unnecessary, and that every part shall be best adapted for its intended use.

6th. Their harmonious combination of colours.

Looking to the relative advance of different countries to a higher perfection, and taking the carriages examined by the jury as a standard, the credit of the greatest general progress must be accorded to France. It illustrates what the French did not give themselves credit for at the time the existing treaty of commerce between France and England was in course of arrangement, namely, that by putting forth their energies and applying their talents to what they undertook in the arts of peace, they were quite capable of holding their own against the manufacturers of other countries.

Relative
progress of
different
countries (as
evidenced in
the carriages
shown).

Next in order of progress stands the city of Rome, the contributions from which are few, but one of them, a landau on under and C springs was marked by great care and good taste in the design and execution.

Russia takes the next place in relative progress, shown especially in the travelling carriage and park phaeton from St. Petersburg, contributed by two of the Russian Court coach builders.

Next in relative general progress stands Great Britain, not that some of its coach builders cannot still hold the lead acquired by their predecessors, as illustrated by several carriages of the highest excellence in the British department, but taking each national display collectively it must be confessed that the department would have stood much higher as to general relative progress if many of the carriages had been retained at their respective places of production.

The United States of America stand next, with several carriages of sound construction and high finish and of a purely American type, which is not held in such high esteem in Europe, as in the place of their production. However, it is becoming apparent that the prejudice against European carriages is not so great among Americans as it was formerly, for a number of European carriages are now finding their way into the United States.

Switzerland follows with a carriage purely Swiss, of which the construction may be thus explained. A tilbury body hung sideways on four wheels, with a light upright fixed head built up the back and ends; the front is enclosed and has a door in the centre; over the door and the lower front

MR.
HOOPER
ON
CARRIAGES,
&c.

British
inventions
take the
highest
position.

enclosure are windows; the persons seated inside thus see only one side of the road, which to tourists visiting the country for the pleasure of its scenery must be a disadvantage, but it must be remembered that it is so constructed for the convenience of travelling over narrow mountain roads.

The several other exhibiting countries seem to have made little perceptible progress, and the list closes with Tunis, whence is sent a humble coach on two wheels, such as one might fancy would just suit the queen of the gipsies.

As regards inventions, improvements, and adaptations of varying degrees of merit and originality the British department stands first, and several carriages attract much attention from foreign coach builders and visitors.

The greatest novelty to visitors is Morgan's patent landau, the head of which can be readily raised and lowered without further labour than turning a handle, which acts on a screw in combination with a series of levers.

Next in order stands the landau with Fuller and Martin's patent. In this carriage also, a handle turned by the driver raises and depresses the head. It differs from Morgan's, inasmuch as the power is applied by means of a steel cord passing over a series of wheels in conjunction with levers regulated by the action of the steel cord. By an ingenious arrangement the system is applied to landaus having windows in the front sides.

Rock's landau stands next. In this carriage the head partakes much of the ordinary arrangement of such carriages. In order to facilitate the closing of the head a set of very carefully adjusted steel springs fixed in the body assist in overcoming the resistance of the weight that has in ordinary cases to be lifted in closing landau heads.

Hooper's "drag" is noticeable for the combination of arrangements which enable a party to partake of lunch by means of tables forming part of the carriage, and which are concealed when not required for use.

The barouche by the same firm is an example of lightness combined with elegance of outline. The colours of the wheels, springs, &c. &c., were arranged to produce a subdued brilliancy that at a short distance from the eye should give a chaste and pleasing effect. The interior is noticeable for the comfortable arrangement of the squabs and seats.

The "drag" and "barouche" of Peters and Sons are noticeable for the "chic" that appertains to all carriages turned out by that celebrated firm; and whether they are regarded from the point of view of refinement and good combination of outline, of general elegance and good proportion, or for high finish, they are carriages worthy of careful study.

The barouche of Laurie and Marner is a carriage that also deserves examination, as well for elegance and high finish as for rich combination of colours.

The landau of Wyburn and Co. is a good example of the elegant and stylish carriages of this class, and is noticeable for good outlines and proportions as well as good combination of colours.

The miniature brougham of Aldebert is an example of the very light broughams now built in great numbers in London, the combined use of tough steel and hickory having given a great stimulus to the production of such light carriages. It is probably the lightest brougham in the Exhibition.

The carriages of Messrs. Holmes are noticeable for the care bestowed on the painting and the high finish and brilliancy of the varnishing.

The private omnibus of Mr. Starey is noticeable for its good outline and style; the inside and outside seats are roomy and comfortable; the painting and lining are executed with care and good taste.

The carriages of Messrs. Hutton are noticeable for the quiet good taste of the colours and their good finish.

The carriages of Mr. H. Mulliner are noticeable for their lightness, and their suitability for use in hilly parts of the country.

The barouche of Mr. F. Mulliner is noticeable for its good style and correct outline of body, together with good taste in the colours.

On the French side the carriages of Messrs. Binder frères claim the first attention. Their "dress chariot," built for Count Nieuwerkerke, is a very good specimen of coach building. The body leaves nothing to be desired as regards the refinement and good treatment of outline, the side rounding and turn under being in perfect harmony with the general form. The lining and hammercloth do credit to the high standing of the Paris coach trimmers. The painting of the arms on the panels and the chased silver ornaments of the hammercloth are also of great excellence.

The French
carriages.

The carriages of Messrs. Belvallette frères have at each Exhibition shown a sure and steady progress on the preceding one, and have always been rewarded by the juries on each occasion. Their "drag" has so close a resemblance to the English ones in ordinary use, that at a short distance it would be difficult to say whence it had its origin. It has many excellent points as regards construction and finish, and does them much credit. Their posting barouche is also a carriage of high excellence as regards outline, proportion, and style, and good taste in painting and lining.

MR.
HOOPER
ON
CARRIAGES,
&c.

The cabriolet of M. Ehrler* is of elegant form, and is besides well balanced. The workmanship is excellent, and the colours are in good taste. It is moreover very comfortable.

The landau by the same builder is of elegant form and high finish.

The brougham of M. Poitrasson is of good style, materials, workmanship, and high finish.

The little dress coach of M. Kellner deserves careful examination, and is a good illustration of a class of carriages made with great success in France to meet the demands of wealthy persons in tropical climates, especially of those to whom show and glitter is essential. Firstly, it is of good outline, proportion, and style. Secondly, it is light, and suitable for the small horses generally used in such countries. Thirdly, its general treatment is rich and handsome, without being tawdry. Fourthly, the construction is good and sound, giving promise of a fair amount of durability. Fifthly, the workmanship in the departments of painting, trimming, chasing, &c. show good ability; the painting is rich, the lining is sumptuous, and withal has an air of chaste and elegant richness.

The coach and landau of M. Moingearde are specimens of well wrought designs, carefully proportioned, and with refinement of finish.

The landau on C springs of M. H. Binder is of excellent design and proportion, and the colours are in good taste. The same may be said of his brougham. The lining of black satin relieved with scarlet has a very happy effect. The park phaeton is of elegant form, light, and well hung.

The brougham of M. Wiederkehr is an unusually good specimen of a provincial carriage, and well deserves in every way its high position in the list of awards.

The barouche of M. Desouches is of good form, well hung, has good materials and workmanship, and is a stylish park carriage. The same remarks apply to the brougham, which besides has the advantage of M. Desouche's improved door lock, by which arrangement the inside handles for opening the doors are not so liable to injure ladies' dresses as the projecting ones in ordinary use.

The landau of M. Bouillon has an arrangement by which the doors can be opened while the glasses are up, and the carriage is besides finished in good taste.

The chariot and phaeton of Messrs. Delaye are noticeable for the skill shown in the iron work, not that the costly and

* France is much indebted to this house for many of the improvements introduced in French coachmaking within the last 20 years, tending greatly to the development of an important industry.

useless work tends to render the carriages better, but merely shows the ingenuity and patience of the workmen in overcoming certain difficult processes in their art.

MR.
HOOPER
ON
CARRIAGES,
&C.

The landau on C springs sent by M. Casalini from Rome is a remarkable carriage; the body, for refinement of outline and general form, leaves nothing to be desired. It combines all the latest improvements as regards the flat falling of the head, is well hung, and is painted and lined with good taste. Were it not that the leatherwork is coarsely wrought it would be considered a very perfect carriage.

The carriage
from Rome.

The park phaeton of M. Breutigam, from St. Petersburg, is of good form and style, well proportioned, and finished in good taste.

The Russian
carriages.

The "tarantas" or Siberian travelling carriage of M. Nellis, from St. Petersburg, has many points of great excellence. It is a difficult problem cleverly solved, namely, how many comforts and conveniences can be combined in a carriage without rendering it too heavy or too complicated? The answer is the carriage itself, which must be judged of solely for the purpose intended, and not by the standard of Western Europe, where good roads and hotels are abundant. Thus in a thinly inhabited country there must be space for provisions, bedding, fire-arms, musquito nets for summer, and secure shelter from the severe snowstorms of winter, and tools and spare parts in case of upsets and breakages, together with boxes for clothing and other things that are usual for travelling carriages.

These two carriages alone show what rapid progress Russia has made in carriage building during a very few years, and as the exhibitors are well educated men of considerable intelligence, paying frequent visits to London and Paris, they are likely to make still more rapid progress now they have overcome the chief difficulties in their way. Having been able to train a certain number of native workmen up to a given standard of skill, they will in all probability soon train others to the same, or even a higher standard.

M. Arbatski, of Moscow, sends a two-wheel trotting carriage, "à l'Americaine," weighing only 44 lbs.; and a four-wheel trotting carriage "à la Russe," weighing 55 lbs.; these are illustrations of the close resemblance of Russian and American tastes, the good folks of "Moscow" being as fond of trotting matches as those of "New York."

The "trotting phaeton" of Messrs. Wood Brothers, of New York, is noticeable for its lightness and its high finish.

The
American
carriages

MR.
HOOPER
ON
CARRIAGES,
&c.

The
Prussian
carriages.

The "light phaeton" of Messrs. James Hall and Son, of Boston, has also good workmanship, materials, and high finish.

The landau shown in the Prussian department by M. Henning illustrates an effort made in another country to make such carriages in accordance with the wants of the public. Whether the invention was original, or the idea was taken from Morgan's English patent, and the same end worked out by a different method is not certain; however, the head is made to open and close by means of a lever placed on the left side of the driver. The invention is ingenious, and answers its purpose up to a certain point. Simple as the lever system is, it is not so effective as Morgan's plan, which is worked by a powerful screw. The force required to put the lever in action is so great that only a powerful man could work it when encumbered with the charge of his horses. The invention would be rendered much more useful by combining it with Rock's plan of balancing the head with concealed steel springs, and thus removing the necessity of exerting so much force on the lever. By adding Henning's action to Rock's, the latter would become a self-acting head, instead of, as at present, merely a balanced head somewhat more easily opened and closed than those on the ordinary plan. Both inventors may be of service one to the other, by combining the best parts of each system.

The probable effect of combining Henning's & Rock's inventions in one landau.

A military ambulance (said to have been used in the war in Germany last year) was placed among the Prussian carriages, but as such vehicles could be much better appreciated and judged of by the jury for "Military Equipments," the carriage jury left the matter in their hands to be examined and reported on.

The Swiss carriage.

The char-à-coté of M. Hauch, from Geneva, is noticeable as a type of "national" carriage, and has been already described with other national carriages. The workmanship and materials are good.

The list does not include all carriages of merit; its object is to indicate those that are most remarkable for invention, improvement, or great excellence.

This list might be much extended, and does not by any means include all carriages of merit; its object is chiefly to point out to visitors, but more especially to coachbuilders and workmen who visit the Exhibition, those productions which show invention, improvement, and great excellence, either of form, construction, or other feature worthy of notice and study. The reporter has on this occasion a duty of extreme delicacy and difficulty to fulfil, being himself a member of a firm of exhibitors. At the International Exhibitions held in London in 1851 and 1862, the juries appended to each exhi-

bitor's name a concise account of the merits of his goods, and a reason for the award, signed by all the jurors as their joint opinion. On the present occasion, as the class juries were only empowered to send to the Imperial Commission a classified list of exhibitors without remarks, it is necessary for the reporter to preserve some record of the most remarkable objects in the class in accordance with the instructions received from the British Commission, that British reporters should take note of what it is specially desirable that the British public should be made acquainted with.

The carriages for the public service next demand attention. In this important division there is no foreign competition, the only competition being among French exhibitors.

The service of public carriages in Paris and London is organized on totally opposite principles. While that of Paris is conducted by several companies having large subscribed capital, extensive and well organized establishments, and under the rigid control of the prefect of police as to their safety and general condition, those of London are almost entirely left (with the exception of the London General Omnibus Company) to individual enterprise, with a very slight control by the police authorities. In addition to this the British Parliament subjects the service to heavy taxation; the tax on each omnibus amounting to about 23*l.* 4*s.* 3*d.* per year, and on each cab to about 16*l.* 18*s.* per year. In addition to this, Parliament has also fixed the tariff of prices. Having bound that service hand and foot by heavy taxation and a tariff of low fares, the owners of the vehicles have to cut their coats according to their cloth. The public carriages as well as the hotels of a metropolis of a great empire should be somewhat in accordance with its wealth and station among nations, rendering their visits agreeable, and leaving a good impression on strangers, but it must be at once admitted that the cabs of London deserve condemnation alike at the hands of Londoners and foreigners. There are some redeeming points which it is only fair to mention. There are a certain number of "hansom-cabs" on two wheels, well appointed, well horsed, and well driven; their colours are gay, and their brass or silver fittings clean and bright. These give a cheerful aspect to the streets, they get over the ground quickly, and leave a good impression on those who use them.

The public
carriages of
London and
Paris.

It is for the four-wheel cabs of London (which far outnumber the "hansoms") that reform is so much needed. They deserve all that General Morin has said against them in his report to the French Commission on the carriages of the London Exhibition of 1862 (p. 414), but they certainly

MR.
HOOPER
ON
CARRIAGES,
&C.
—

travel faster than the cabs of Paris. These latter are in several respects better than the London ones; they are better built, and are generally clean. But although they get about faster than formerly, their pace is still slow.

Notwithstanding the taxation and low fares of London cabs, they are very numerous, and are used by all classes, from the nobleman to the servant going to her new situation, or the sick patient going to a hospital.

The cheap rate at which they ply for hire renders them useful in carrying goods as well as in conveying loads of luggage to and from the London railway stations; these are matters of great convenience and should not be entirely overlooked, but they are coarse, dirty, and ill kept. What is wanted, is, a better class of cabs for those who are willing to pay a higher price for their use, and this would not be a matter of great difficulty to any municipal council. but appears too small a social matter to engage the time of the Imperial Parliament.

The taxation
on London
omnibuses.

APPROXIMATE TAXATION of CARRIAGES for the PUBLIC SERVICE. LONDON.*

Omnibus.

	£	s.	d.
Annual licence - - -	3	3	0
Duty, $\frac{1}{4}d.$ per mile, 60 miles per day, 6 days per week - - -	19	11	3
Driver, stamp and badge - - -	0	5	0
Conductor, ditto - - -	0	5	0
	<u>23</u>	<u>4</u>	<u>3</u>

The taxation
on London
cabs.

Cabs (four seats).

Annual licence - - -	1	0	0
Duty, 1s. per day, 6 days per week - - -	15	13	0
Driver, stamp and badge - - -	0	5	0
	<u>16</u>	<u>18</u>	<u>0</u>

PARIS.

Omnibus.†

(At 6 days per week.)

	£	s.	d.
5fr. 70c. per day duty to City of Paris -	71	7	6
1fr. 10c. per day to the Government -	13	15	10
	<u>85</u>	<u>3</u>	<u>4</u>

Ditto on
Paris omni-
buses.

* Omnibuses and cabs working on Sundays pay a proportionately higher tax.

† Drivers and conductors are considered in France to belong to the class of workmen (not servants), and are therefore not taxed.

<i>Cabs</i> (four seats).			
(For hire in the streets.)			
	£	s.	d.
1fr. per day duty (6 days per week) -	- 12	10	5
96fr. per year duty - - -	- 3	16	8
	16	7	1

MR.
HOOPER
ON
CARRIAGES,
&c.
The taxa-
tion on
Paris cabs.

<i>Coach-house Cabs</i> (four seats).			
96fr. per year duty - - -	- 3	16	8

Ditto on
Paris "voi-
tures de
remise."

TAXATION ON LONDON PUBLIC CARRIAGES.

<i>Omnibuses.</i>			
	£	s.	d.
Licence duty - - -	- 3,732	3	6
Mileage duty - - -	- 43,395	3	8
	47,127	7	2

Total
amount
levied on
London
public
carriages.

<i>Cabs.</i>			
Licence duty - - -	- 6,427	0	0
Day duty - - -	- 106,032	9	0
	112,459	9	0

Duty collected by police for stamps and badges - - -	- 3,372	10	0
---	---------	----	---

The Paris cabs are not limited, as in London, to close or covered vehicles, but there are many comfortable and convenient open carriages. The better sort have a superior appearance to those of London, and are a source of enjoyment, not only to the French themselves, but also to foreigners visiting their capital.

The "voi-
tures de
remise" are
not limited
to close
carriages.

The French claim great credit for the amount of care, thought, and study bestowed on their public omnibuses, and the success that has crowned their efforts. Looking at the matter from their point of view, this is not to be wondered at, as certainly they have accomplished all that they aimed at. The vehicle shown by the "Compagnie Generale des Omnibus" combines all the latest improvements that a large manufacturing establishment backed by abundant capital has been able to accomplish; and as regards soundness of construction, good suspension, and good finish, is a great success.

The design
and con-
struction of
the Paris
omnibuses.

Its panels are of sheet iron, which is much in favour with the company for the purpose; a simple moveable seat is provided for the conductor, allowing him an occasional rest, which is very necessary for men who have many hours of daily travelling.

Simple ar-
rangement
for enabling
the conduc-
tors to sit
occasionally.

MR.
HOOPER
ON
CARRIAGES,
&c.

In London the men are only provided with the little board they stand on behind, and 12 or 14 hours of such daily travelling must have a pernicious effect in producing excessive fatigue, obviated in a very simple manner by the forethought of the Paris Omnibus Company. Their factory at Batignolles is well worthy a visit, and is willingly shown to visitors by applying to M. Lavollé at the chief office near the Palais Royal, or to M. Noisette at the works.

The Paris
omnibuses
from an
English
point of
view.

Looking at the carriage from an English point of view certain questions naturally arise. Why is the driver separated from his fellow creatures when there is ample space on each side of him for two passengers? It is said that the hind legs of the Paris omnibus horses cannot be trusted, and that passengers mounting to such seats from the front would be frequently kicked. As a remedy for such a state of affairs the seats (if there) might be reached from the roof, as is frequently done in England, where they are generally preferred to any others. Again, why are the carriages so heavy? The reply probably would be that they carry so many passengers; but not more than the London ones, though carried in a different manner. The matter of weight involves that of speed, and it cannot be doubted that before long the Paris public will require to be carried at greater speed. The breed of horses has been much improved in France during 20 years, and if the French cavalry is better horsed, the private carriages better horsed and driven at a more rapid rate, railway trains accelerated, new, straight, and wide streets constructed to facilitate traffic, the pace that was suited to the narrow and crooked streets of old Paris is no longer suited to the Paris of Napoleon the Third; but with heavy vehicles greater speed is almost impossible. Not that the omnibuses of London are perfect models; the space allowed by law to each passenger being barely sufficient for ordinary comfort.

The London
omnibuses
travel faster
than those
of Paris.

However the London omnibuses travel much faster than the Paris ones; their colours are brighter, more varied, and more easily recognized by passengers and strangers than those of Paris; their route is marked in bold large letters on the panels, while those on the Paris vehicles are so small as to be difficult to read at a distance.

The omnibuses of both capitals might be much improved by adopting and combining the best points of each; the public would be better satisfied, and would support the owners more cheerfully if their wants were more cared for.

The
American
"tramway-
omnibus"
and its
advantages.

It is, however, to America that we must look for "the omnibus" in its greatest perfection, as regards speed, space for passengers, and easy movement.

MR.
HOOPER
ON
CARRIAGES,
&c.

The Americans have managed to combine the advantages of the railway with the omnibus for the traffic of their great cities. While we in London have been spending fabulous sums in carrying railways over our houses and under our feet, they have laid down economical tramways in their streets, increased the capacity of their omnibuses, and, with the same allowance of horses per carriage, take their passengers with great speed and personal comfort. The luxury of their system was exemplified in a "tramway omnibus" shown in the American annexe; the high finish and neat arrangement of the vehicle left little to be desired in all the essentials of a good public carriage.

The plan is about to be introduced to the notice of the British public by Messrs. John Noble & Co., and has already been commented on most favourably by Dr. C. Mackay, who shows that it is in full working order in New York, Brooklyn, Philadelphia, Baltimore, Chicago, Montreal, and Toronto.

Its general
use in
certain
American
and Cana-
dian cities
and towns.

A prejudice exists in London against such a system by reason of a very imperfect pattern of rail having been laid down experimentally some years ago in London; its defects were so great that it not only lamed and injured many horses, but strained many private carriages, thus causing great inconvenience and loss to their owners.

The existing metropolitan railways by no means satisfy the great want of speedy and economical means of communication between the various parts of existing London, as may be judged by the crowded state of the streets, notwithstanding the great traffic carried on by the new railways. Since the introduction of omnibuses, about 30 years ago, but little improvement has been effected either as regards speed or comfort to the passengers; some system of tramway would undoubtedly render great service to those to whom time is money, and whose journeys might, by the American system, be more rapidly made.

Next in order to be noticed is an important sub-class, comprising working drawings and detached and accessory matters that are sometimes produced in the carriage building establishments, but much more frequently by separate trades and individuals devoting attention to some special department. In this matter the French coach builders are much more efficiently aided than the British, and the number of French exhibitors in the sub-class to a certain extent illustrates the importance attached to it and the useful position it occupies. Its enterprise has been rewarded

Examina-
tion of the
sub-class.

MR.
HOOPER
ON
CARRIAGES,
&C.
—

by a large export trade, which is yearly becoming more important, and their large well organized establishments offer great facilities to French coach builders for the rapid construction of their carriages.

Dupont's
full-sized
working
drawing on
paper.

The most interesting exhibit in this department, and the one that will in all probability have the most important and beneficial influence on the future of French coach building (and will be found in the French carriage annexe), is a full sized working drawing on paper of a landau on under and C springs, drawn by M. Albert Dupont (of 14, Rue Roussel), who has been awarded a bronze medal by the jury in recognition of his skill as a carriage draughtsman and designer. This exhibitor was one of the selected delegates appointed by the Paris workmen to visit and report on the carriage department of the London Exhibition of 1862, and also to visit and report on the London carriage manufacturing.

At his studio he produces, at a fixed tariff of prices for French and foreign coachmakers, accurate full-sized working drawings of carriages, so that the operatives have only to work from them with care to carry out the precise intentions of the artist. If due care be given by the workmen in producing each part accurately, the whole will so fit when the parts are brought together, as to relieve them of a vast amount of trouble and annoyance resulting from the old plan of working by the "rule of thumb." The system was prominently put before the public at the Paris Exhibition of 1855 by M. Charcot, a Paris coach builder, and duly noticed in the English report of that Exhibition. The plan is not absolutely new, as it has been usual with all the best English coach builders to design their carriages at their full size in white chalk on large black boards kept for the purpose. The advantage of M. Dupont's plan of making them in pencil or colours on large sheets of strong paper is, that they can be put aside for future use, whereas, after the chalk drawings are rubbed out, their only records are the carriages built from them, or the measurement books of the master or workman.

Brice
Thomas'
publica-
tions.

The next in interest are the publications connected with carriage building by M. Brice Thomas, 106, Boulevard Haussman, who periodically publishes "*Le Guide du Carrossier*," a magazine, having a large circulation, devoted to the advancement of coach building. A bronze medal was awarded him by the jury. Not only does it furnish information relating to inventions, new processes, and various matters relating to the state of trade, the amount of exports and

MR.
HOOPER
ON
CARRIAGES,
&c.
—

imports, coloured drawings of fashions, new forms, &c., but working drawings to scale, accompanied by all necessary measurements for producing the carriages they represent. It also supplies patterns of colours, with new combinations and tints. The editor does not confine his attention to carriages only, but has besides published some good illustrations of harness and saddlery produced by the best Paris manufacturers.

M. Guillon's
publica-
tions.

Next in order are the exhibits of M. Guillon, of 80, Boulevard de Courcelles. (Honourable mention awarded by the jury.) These comprise a periodical publication connected with carriage building, besides various designs of carriages and harness. To M. Guillon belongs the merit of having first commenced such publications, which have had a very beneficial influence on carriage building in France. There exist similar publications in America and in Germany. Such a publication was carried on in London for several years, and enjoyed a large circulation. Its financial affairs were mismanaged, the publishers were unacquainted with the special requirements of the coach builders, and so it ceased to exist. Looking to their success in other countries, when managed by persons duly qualified, there is an opening in England for a similar publication, as well as for a producer of full sized working drawings like those made by M. Dupont. In fact it is to be hoped that at no distant time all the best English body and carriage makers and smiths will be able to draw out their own portions of work, in order that they may fully understand what they are required to produce before they commence their labour, and the necessity of their working in harmony in order to produce a successful result.

The studios of the three last-mentioned exhibitors should be visited by all foreign master coachmakers and coachmaker's workmen during their stay in Paris.

The wheels shown by Messrs. Colas, Delongueil, and Communay, of Courbevoie, deserve special notice as representing important works for producing carriage wheels by machinery in order to meet the large and increasing demand for wheels caused by the increasing traffic of the city of Paris. This establishment illustrates the rapid advance made in France by the application of well contrived machinery to facilitate the production of articles for which there is an increasing demand. This establishment well deserves a visit.

French
machine-
made
wheels.

The machine-made wheels shown by the "Leamington Wheel Company" (Great Britain) also deserve notice as an attempt to supply the very large and increasing demand for light carriage wheels in England, most of the large wheel

English
ditto.

MR.
HOOPER
ON
CARRIAGES,
&c.

works at present being fully occupied in producing heavy wheels for waggons, carts, omnibuses, and public cabs.

The show of axles, springs, coach ironmongery, &c. in the French carriage annexe deserves notice, as does also the show of carriage laces and of coach ironmongery in the department immediately adjoining that of French carriages.

British invention in connection with carriage building.

Next in order is the subject of general invention as connected with carriages, in which England claims and is justly entitled to a very high position, in fact, such a rank as England may justly be proud of.

Elliott's invention and patent of elliptic springs in 1804.

If it be asked in what do carriages of to-day differ most from those of 50 years ago, it must be answered at once that it is in reduction in weight and their consequent increased facility of movement. In the year 1804 Obadiah Elliott invented and patented his plan for hanging carriages on elliptic springs, thus dispensing with the heavy combined wood and iron perch and cross beds that had invariably been used up to that time. This invention had such merit that it has virtually put the old plan out of use, and of the 170 carriages in the Exhibition it is probable that more than 100 are hung on Elliott's plan more or less improved and modified.*

Its general application at this time.

The addition of under springs to perched carriages by Windus in 1818.

Subsequently the addition of under springs to perch carriages, about the year 1818, was made by Windus. This was a grafting on of Elliott's invention to the old system. It was found that the elliptic springs did not give sufficient ease to the carriage on bad roads, and the addition of a set of horizontal springs below the C springs had the advantage of rendering the carriages easier and more durable, by relieving the perch and beds from the direct concussions caused by ruts and holes.

The introduction of concealed hinges in 1818.

About the same time concealed hinges were invented. For many years the workmen found so much difficulty and trouble in fitting and adjusting them that only the most skilled men could apply them; now all good workmen are considered able to apply them, and they are in general use in every country that can make carriages even tolerably well.

The invention of japanning leather.

To England is due the invention of patent or japanned leather. Before this improvement all open carriages were made with heads and aprons of black greased leather, and those who used them were always liable to soil their hands, gloves, and clothes in the course of a drive. This was especially disagreeable for ladies, whose delicate coloured dresses

* He was rewarded by the gold medal of the Society of Arts, and built large numbers of carriages under his patent.

suffered more than the darker clothes of the gentlemen. The comfort of an open carriage is therefore much enhanced by the invention. The best carriages all over the world are now always furnished with the improved leather, which is made very successfully in other countries besides England.

MR.
HOOPER
ON
CARRIAGES,
&c.

In 1792 was invented the improved and patented axle by John Collinge, enabling a carriage with such axles accurately fitted to carry a supply of oil for three months, avoiding the noise and rattle of the old grease carrying axles, and avoiding the dirty and troublesome process of fresh greasing every day, besides the annoyance in travelling of being occasionally stuck fast in the road from the greasing being badly performed at the last halting place.*

The invention and patent of axles to carry oil, by Collinge in 1792.

In 1846 was introduced and perfected, by George Hooper, sen., the system of suspending carriages on a single wrought-iron perch supported on horizontal undersprings. The plan was rendered possible and successful by relieving the perch of the sudden concussions and vibrations of the road by means of the under springs; so that the perch being light, and to a certain extent elastic, enabled all the other parts in connexion to be rendered proportionately light. Thus the wheels, axles, springs, beds, and ironwork were all reduced in weight; and although the system was at first applied only to broughams and light carriages, it has gradually been applied to some of the largest carriages now in use, not only in England, but in almost every country where carriages are made. In the present Paris Exhibition there are no less than 35 carriages from various countries suspended on this plan, and the three exhibitors of private carriages who have been awarded gold medals each show one or more carriages to which the system is applied.

The introduction of wrought-iron perches by George Hooper, sen., in 1846, and their general use at this time.

The invention not appreciated at the Paris Exhibition of 1855.

Another invention of great utility was due to the late Mr. Joseph Holland, carriage juror at the London Exhibitions of 1851 and 1862. It is generally known in England as the "cut through doorway," and consists in making the carriage doors extend to the actual bottom line of the carriage, strengthening the parts of the bottom, where cut through, with strong plates of iron or steel fixed edgeways. It has been the means of rendering landaus and many other carriages more commodious, and accessible with a single step instead of the double folding step formerly almost indispensable. There is less chance of tripping in getting into or out of the carriage, the bottom framework being so much reduced in depth, and it has also permitted

The introduction of the cut through doorway by Joseph Holland.

* Such axles are now in general use in almost every part of the civilized world where carriages are built.

MR.
HOOPER
ON
CARRIAGES,
&c.

more graceful proportions in consequence of the elbow or waist line being depressed, which renders the panels shallower and lighter in appearance.

The self-
acting heads
of "Mor-
gan," "Mar-
tin and
Fuller," and
the balanced
head of
"Rock."

Next in order are the self-acting, balanced, and flat falling landau heads of Morgan, Martin and Fuller, and Rock, that of Morgan dating in 1862, and those of the other two dating between that year and 1866. There are examples of each in the present Exhibition, and their action has already been described. It is due to these inventors to give them credit for great ingenuity in the application of the separate and combined parts of their systems. They have besides helped on this occasion to uphold the national character for originality of invention in a manufacture in which England has for many years taken the lead of all other countries.

Spring-
making
machinery.

Several processes and improvements recently introduced in England are also worthy of notice. One is a spring making machine that cuts the bars of steel to a proper length, tapers the plates by passing the ends through elliptical rollers, rounds the end of the plate, punches the rivet hole, and forms the stud and its correspondingslit. The amount of labour saved by this machine is very great; the plates are more regularly tapered, and the work can be performed more accurately. They will doubtless soon supersede the old plan of tapering the plates, &c. by hand labour.

Wrought-
iron axle
boxes.

Another very recent introduction is the use of wrought-iron, instead of cast-iron, axle boxes. They are less in weight, less brittle, and are said to be more durable than those generally in use. It requires time to test their true value, and to ascertain if they fulfil all that is said in their favour.

Breeze fuel
for smiths'
forges; it
produces
little or no
smoke.

Another recent process is of great importance to all coach-makers and coachsmiths. It consists in working the forges with a fuel called "breeze" instead of with coal. It is a partially burnt coal that falls through the bars of the puddling furnaces in making bar iron. It has the advantage of producing a clear strong fire without smoke. All practical coach builders know the injury done to their premises, and especially to their stock of carriages, by the smoke of their forges; and the fuel not only obviates this great nuisance, but prevents the workmen being rendered so dirty by their occupation. It allows their department to be kept cleaner and more cheerful, and will doubtless tend to their personal comfort, matters of no small advantage to working men.

Swedish
iron bolts
and clips,
with Whit-

There have also been introduced by Mr. Richards, of Birmingham, bolts and clips of the toughest and best Swedish iron, screwed to Whitworth's pitch of thread. The advan-

tage of these bolts and clips is that they allow of smaller holes being made through the parts they fasten, a matter of much importance in the manufacture of light carriages that are made for work as well as for show.

MR.
HOOPER
ON
CARRIAGES,
&c.

worth's
pitch of
thread.
Belvallette's
invention
for lowering
landau
glasses.

An ingenious plan has lately been devised by M. Belvallette, by which the spindle of the carriage door handle, acting on a series of cranks and levers, heaves the glass over the fence plate, drops it into the door, and thus saves the trouble of putting down the glass previous to attempting to open the doors of landaus.

There are doubtless numerous other inventions and improvements that might be noticed. Those mentioned, however, have mainly decided the type and character of the carriages now in the Paris Exhibition. To the French belongs the credit of the application of tough steel instead of iron in aid of a reduction of weight. To them also belongs the credit of more comfortable and elegant carriage linings. Their metal chasing has more style, vigour, and character than that of England; and although the list of French inventions as applied to carriages contrasts disadvantageously with that of the English, and France has hitherto relied on England for her fashions and improvements, there are now signs of more vigorous life among French coach-builders; they are wanting neither in enterprise nor capital, and there seems a probability of a prosperous future before them.

French ap-
plication of
tough steel.

French me-
tal chasing.

France in-
debted to
England for
carriage
fashions and
improve-
ments.

In placing their carriages in position the Paris builders had an advantage over the English, inasmuch as they were only required to occupy their space a few days before the opening day, whereas the carriages from England had to be in the building several weeks in advance, and in the midst of the dust and dirt of incomplete building operations. Notwithstanding all disadvantages, most of the English carriages were not only in good condition for exhibition on the opening day, but the British carriage class was the first class completed in the whole Exhibition.

The depart-
ment first
ready for
exhibition
was that of
British
carriages.

The "Cluny Museum" in Paris contains the following antique carriages, &c. that deserve mention. Among them are the following:—

Antique
carriages at
the "Cluny
Museum"
in Paris.

A curricule built in Holland in the 17th century.

An Italian carriole, built at Verona in the 16th century by Gio. Batta Maretto. Painted by Vernicie.

An Italian state coach, built at Bologna in the 16th century for Pope Paul V.

MR.
HOOPER
ON
CARRIAGES,
&c.

An Italian state coach, built at Milan for a French ambassador at Milan under Louis XIV.

An English state coach, built in London in the 16th century by Holden Constable for a Prince of Wales.

An Italian state chariot, built at Bologna in the 16th century for a member of the Farini family.

A sledge in the form of a dragon, gilt, built for Louis XIV.

A sledge formerly belonging to the Queen of Louis XIII.

A sedan chair, formerly belonging to a member of the Borgia family.

These specimens of the past have been collected within the last 18 months, and have not yet found their way into the Cluny catalogue.

They will, most of them, be found full of interest, not only from their excellent state of preservation, but from the taste displayed in their ornamentation, and in many cases the chaste arrangement of their colours. The London carriage will be interesting to British subjects as showing that their countrymen several centuries ago could produce state carriages that would bear comparison with those of Italy, which country then stood at the head of many manufactures requiring skill and good taste. Practical coachmakers will probably also be surprised to find on one, if not more, of these carriages veritable C springs, supposed by most people to be a comparatively recent improvement.

The Spanish
state har-
nesses.

Zurdo's
work on the
manufac-
ture of
harness in
Spain.

The collec-
tion of
models, &c.
at the "Con-
servatoire
des Arts et
Métiers."

In the Spanish section of the Exhibition, and in a class allied to that of carriage building, is a case of saddlery and state harness made by D. Jose Rodriguez y Zurdo, court harness maker, of Madrid. It is not uncommon at International Exhibitions to discover certain manufacturers of great skill, little known beyond their own country. This exhibitor has published a work in the Spanish language on the manufacture of harness and saddlery, and if his talent as an author is equal to his skill as a manufacturer, the work would be well worth translating into English or French.

The "Conservatoire des Arts et Métiers" should also receive a visit; in it will be found models, drawings, and plans of processes connected with almost every existing manufacture and art, a collection which reflects great honour on the French Government, and has doubtless tended much to the development of art and industry in France. Lectures are frequently delivered in the lecture room, which are very fully attended, and doubtless tend to the esteem in which this great establishment is held by the French people.

The streets
of Paris.

In passing to and fro in the Paris streets visitors from all

MR.
HOOPER
ON
CARRIAGES,
&c.

The provin-
cial roads of
France.

parts of Great Britain will doubtless compare their own metropolis with that of France, and give a certain amount of credit to the Imperial Government for its policy in rendering Paris so worthy of being the capital of a great empire. Improvements are not confined to the capital, many of the large towns being now rendered more healthy and enjoyable. The public roads throughout France have also benefited by the care, and labour bestowed on them. Not only are they kept in excellent repair, but at the towns, villages, and cross roads strong and legible direction posts guide the traveller to his destination, informing him not only of the commune and department he is in, but the distance to the principal as well as the nearer towns.

Englishmen must live in hope that their metropolis will not always be as it is, and that its governing bodies will sooner or later take lessons in road making and management from the French.

London road
making and
road man-
agement.

As a slight evidence of the activity of the present generation of coach builders, it may be mentioned that some among the British exhibitors have during the last few years visited the United States, France, Russia, Italy, Spain, North, Central, and South Germany, Denmark, Belgium, Holland, and Switzerland. Among the French, several have not only visited Spain, Italy, Germany, and other adjacent countries of the continent, but have extended their travels to Turkey and Egypt; and not only were several Prussian, Austrian, and Italian exhibitors present when the jury made its examination, but there were present also exhibitors from Warsaw, St. Petersburg, and even Moscow.

Useful information has been kindly furnished by Messrs. Belvallette on several matters that may be interesting to Englishmen. An important industry exists in Paris, which although it has a counterpart in London has not reached so extensive a development. There are in Paris four or five large establishments of "loueurs de voitures," called in England "job masters" or "livery stable keepers." These Paris establishments have never less than from 200 to 300 horses, and an almost equal number of carriages. Besides these there are many smaller establishments keeping from 10 to 20 horses and as many carriages. This is said to be due to the large number of foreign visitors who resort to Paris.

The Paris
"loueurs de
voitures."

In England another system exists, not known in the same form in France. A very large number of carriages are built and finished to order, and hired for periods varying from three to seven years, on condition of a fixed sum, payable annually in advance, the coach builder doing at his own

London job
carriages.

MR.
HOOPER
ON
CARRIAGES,
&c.

—
Wages of
London and
Paris.

cost all repairs except those caused by accident or unfair usage.

The success of the export trade in any manufacture materially depends on the rate of wages paid and the amount of work produced for a given sum of money. In comparing the wages of coach workmen in Paris and in London for the best kinds of work, the wages of Paris are somewhat lower than those of London in nearly all branches. The greatest disparity exists in the pay of Paris bodymakers, who are paid much less than those of London, while, however, the smiths receive more. The reason may be this, that what is done by the London bodymaker, such as hanging doors, fixing plates, locks, hinges, &c., is in Paris done by the smith, who must acquire that special knowledge that is not expected of the Paris bodymaker.

A comparison of the hours of labour usual in Paris and in London may be interesting to both employers and employed in both capitals.

Hours of
labour in
Paris.

In Paris the men commence work at 7 in the morning and leave at 6 in the evening, allowing one hour for refreshments from 11 to 12 at noon, thus leaving 10 hours a day, and 60 hours for work in each week.

They are paid once every fortnight, on alternate Saturday evenings at 6 o'clock.

There is much less Sunday labour and business than formerly, and it seems to be still on the decrease.

Hours of
labour in
London.

In London the hours of work are, in summer, from 6 o'clock in the morning to 7 in the evening, allowing two hours for refreshment; from 9 to $\frac{1}{2}$ past 9 for breakfast, from 1 to 2 for dinner, and from 5 to $\frac{1}{2}$ past 5 for tea; and in winter the hours are from 7 to a quarter to 8 o'clock in the morning (depending on the time it is light enough to work) till 7 in the evening, allowing two hours for meals as in summer. And the system for the last two years has been to leave work every Saturday in the year at 4 p.m. Thus there are of working hours per week, in summer, $63\frac{1}{2}$; in winter, $57\frac{1}{2}$. They are paid every Friday evening at 7 o'clock.

There is no Sunday labour carried on in the London carriage manufactories (with very rare exceptions, and those mostly in the busiest period of the London season).

The Conseils
de Prud-
hommes
and Conseils
Syndicals
of Paris.

There exist in Paris two special tribunals connected with the trade of coachmaking, the "Council of Prudhommes," and "the Syndical Council." The former is composed of equal numbers of masters and workmen, and examines into all disputes as regards the relations of masters and workmen. The experience of its working shows that its decisions are generally received as just arrangements between the

parties who appeal to it. The latter hears and decides matters in dispute between coach builders and their customers, as well as special matters that may be referred to them by the ordinary law courts. It also represents the interests of the French coach building trade in all commercial inquiries, and is charged with advancing its general interests.

MR.
HOOPER
ON
CARRIAGES,
&c.
—

It is difficult to compare the question of rent and taxation in the two capitals; there seems reason to believe, however, that at the present time they are higher in Paris than in London.

Rent and
taxation of
London and
Paris.

The subject of general education of workmen, not only in elementary schools, but in the theory and practice of their trades, deserves the utmost attention, in order that they may understand the laying out of the work, so that on its completion it may answer the purpose of its designer. To Great Britain this is specially important, in order to keep pace with the competition of foreign states, and to maintain in profitable employ the people of a densely populated country, whose prosperity largely depends on the success of its manufactures.

Education
of workmen
and appren-
tices.

Now that the final awards have been made and published, some notice may be taken of the system on which they were arrived at, in order to justify the recommendation of the Class Jury. Although some deference is due from the minority to the majority on a Class Jury, there is likely to be much less from one colleague to another on the Group Jury, the members of which represent different trades, and are therefore not equally competent to judge of the merits of any particular class of manufacture. Thus, a majority of the Class Jury (61) placed five exhibitors on its list for gold medals, and on the matter being brought before the Group Jury 6, as it was said that the original number of 100 gold medals would not be increased, the aim of each member of the Group Jury was to reduce the list of his neighbour, and retain his own. The names stood thus—(1.) Belvalette. (2.) Peters. (3.) Paris Omnibus Company. (4.) Laurie. (5.) Ehrler. In order not to risk losing the whole, the three first only were recommended at the early meetings of the Group Jury; but a member of that jury proposed that if only two gold medals were awarded they should be given to the two first French exhibitors on the list, to the exclusion of the English exhibitor who was second on the list. This injustice was, however, frustrated.

Alteration
of award by
Group Jury.

When the number of gold medals became, as it was ultimately, increased to 900, a claim was put in for the two exhibitors who were next on the list. It, however, pleased

Gold Medals
increase 1
in number
from 100 to
900.

MR.
HOOPER
ON
CARRIAGES,
&c.

the Group Jury to omit the English exhibitor next in rotation (No. 4), and to confer the next gold medal on the French exhibitor (No. 5). This proceeding entirely altered the proportion of gold medals awarded to the two countries. As recommended by the Class Jury they stood in the proportion of two gold medals to French private carriage builders, two to English private carriage builders, and one to the Paris General Omnibus Company; there was a certain fairness of proportion as regards merit, but by the decision of the Group Jury the medals stand three to one in favour of the French, for which the foreign members of the Class Jury cannot be held in any way responsible.

The awards
to co-operators.

The subject of awards to co-operators was brought before the Class Jury just previous to its dispersion; the selection of names on the list was made in the absence of the British juror.

Having now completed the report of the carriage department of the present French Exhibition, and furnished some information respecting the future and permanent interests of this particular branch of industry, it only remains to give a list of the awards recommended by the Class Jury 61, which were as under:—

The list of
awards as
settled by a
majority of
the Class
Jury (61).

GOLD MEDALS.

- | | | | |
|------------------------|---|---|-------------------|
| 1. Belvallette Bros. | - | - | France, 1. |
| 2. T. Peters and Sons | - | - | Great Britain, 1. |
| 3. Com. G. des Omnibus | - | - | France, 2. |
| 4. Laurie and Marner | - | - | Great Britain. |
| 5. G. Ehrler | - | - | France, 3. |

SILVER MEDALS.

- | | | | |
|-----------------------------|---|---|-------------------|
| 1. C. Poitrasson | - | - | France, 1. |
| 2. Kellner | - | - | France, 2. |
| 3. Wyburn and Co. | - | - | Great Britain, 2. |
| 4. W. Cole | - | - | Great Britain, 3. |
| 5. E. and G. H. Morgan | - | - | Great Britain, 4. |
| 6. Moingeard Bros. | - | - | France, 3. |
| 7. H. Binder | - | - | France, 4. |
| 8. W. H. Mason | - | - | Great Britain, 5. |
| 9. Wiederkehr | - | - | France, 5. |
| 10. I. Aldebert | - | - | Great Britain, 6. |
| 11. P. Casalini | - | - | Rome, 1. |
| 12. Desouches, Son, and Co. | - | - | France, 6. |
| 13. Rock and Son | - | - | Great Britain, 7. |
| 14. J. Rothschild | - | - | France, 7. |
| 15. C. Braeutigam | - | - | Russia, 1. |
| 16. C. Nellis | - | - | Russia, 2. |
| 17. J. Ward | - | - | Great Britain, 8. |

18. H. and A. Holmes	-	-	Great Britain, 9.
19. Woodall and Son	-	-	Great Britain, 10.
20. P. De Man	-	-	Belgium, 1.
21. Remery, Gautier, and Co.	-	-	France, 8.
22. Colas and Co.	-	-	France, 9.
23. Dick and C. T. Wecker	-	-	Hesse, 1.
24. E. R. Bouillon	-	-	France, 10.
25. A. Mazzuchelli	-	-	France, 11.
26. Muhlbacher and Son	-	-	France, 12.
27. A. Henning	-	-	Prussia, 1.
28. J. Cockshoot, junr.	-	-	Great Britain, 11.
29. Wood Bros.	-	-	United States, 1.
30. J. Hall and Son	-	-	United States, 2.

BRONZE MEDALS.

1. J. and A. Fuller	-	-	Great Britain, 1.
2. T. R. Starey	-	-	Great Britain, 2.
3. Ivall and Large	-	-	Great Britain, 3.
4. E. Fredet	-	-	France, 1.
5. J. C. Trefil	-	-	France, 2.
6. N. Henocque, Arlot, senr., & Co.	-	-	France, 3.
7. A. Dupont	-	-	France, 4.
8. G. Bail, senr.	-	-	France, 5.
9. L. C. Bail, junr.	-	-	France, 6.
10. J. Lohner	-	-	Austria, 1.
11. J. Neuss	-	-	Prussia, 1.
12. M. Hansen	-	-	Prussia, 2.
13. J. Hutton and Son	-	-	Great Britain, 4.
14. W. and F. Thorn	-	-	Great Britain, 5.
15. Labourdette, Brothers, and Co.	-	-	France, 7.
16. Million, Guiet, and Co.	-	-	France, 8.
17. G. S. Windover	-	-	Great Britain, 6.
18. A. L. Geihel	-	-	France, 9.
19. H. Mulliner	-	-	Great Britain, 7.
20. M. Hauch	-	-	Switzerland, 1.
21. M. L. Hermans	-	-	Holland, 1.
22. Maurice Bouché	-	-	France, 10.
23. H. Boulogne	-	-	France, 11.
24. McNaught and Smith	-	-	Great Britain, 8.
25. F. Bani	-	-	Italy, 1.
26. A. Locati	-	-	Italy, 2.
27. Morel Thibault	-	-	France, 12.
28. Delaye, Uncle, Nephew, and Co.	-	-	France, 13.
29. A. Frémont	-	-	France, 14.
30. Brice, Thomas	-	-	France, 15.
31. F. Mulliner	-	-	Great Britain, 9.
32. A. Hesse	-	-	Russia, 1.
33. N. Arbatski	-	-	Russia, 2.
34. J. Evans	-	-	Great Britain, 10.
35. J. and R. Offord	-	-	Great Britain, 11.

MR.
HOOPER
ON
CARRIAGES,
&C.
—

HONOURABLE MENTIONS.

1. F. N. Lemoine	"	-	France, 1.
2. J. Cooper	-	-	Great Britain, 1.
3. Davis and Son	-	-	Great Britain, 2.
4. C. Raguin	-	-	France, 2.
5. F. H. E. Delongueil	-	-	France, 3.
6. Lelorieux, Brothers	-	-	France, 4.
7. P. M. Charcot	-	-	France, 5.
8. M. Saboleff	-	-	Russia, 1.
9. P. Jakoleff	-	-	Russia, 2.
10. Dufour, Brothers	-	-	France, 6.
11. Delassalle and Son	-	-	France, 7.
12. E. Boulogne	-	-	France, 8.
13. Pilon	-	-	France, 9.
14. Julius Sloor	-	-	Sweden, 1.
15. Iversen	-	-	Norway, 1.
16. Vincent	-	-	France, 10.
17. C. B. Van Aken	-	-	Belgium, 1.
18. J. and C. De Ruyter	-	-	Belgium, 2.
19. A. Van der Borcht	-	-	Belgium, 3.
20. Kellerman	-	-	France, 11.
21. J. M. De Wolff	-	-	Great Britain (Colonial), 3.
22. O'Brien	-	-	Great Britain (Colonial), 4.
23. Star Manufacturing Company	-	-	Great Britain (Colonial), 5.
24. Maharajah Holkar	-	-	Great Britain (India), 6.
25. G. Anthoni	-	-	France, 12.
26. Huard, sen.	-	-	France, 13.
27. A. Guillon	-	-	France, 14.
28. G. Fontange	-	-	France, 15.
29. C. Jaquier	-	-	France, 16.
30. H. Juhel	-	-	France, 17.

AWARDS TO CO-OPERATORS.

Names.	Occupations.	Employers.
SILVER MEDALS.		
F. Tostain	Foreman	Binder, Brothers.
Breteau	Ditto	Paris General Omnibus Com- pany.
Larcher	Ditto	Ehrler.

BRONZE MEDALS.

J. P. Lake	Foreman	Hooper and Co.
Parvé	Bodymaker	Binder, Brothers.
E. Comté	Painter	Ehrler.
Fabas*	Engineer.	—

* Entrusted with the arrangement of Classes 61 and 62.

HONOURABLE MENTIONS.

MR.
HOOPER
ON
CARRIAGES,
&c.

Names.	Occupations.	Employers.
Gau - -	Bodymaker -	Paris General Omnibus Com- pany.
Guinand -	Painter - -	Ditto.
Caveyneau -	Carriage maker	Ditto.
Pierre Maitre -	Foreman - -	Belvallette, Brothers.
Cussonneau -	Ditto - -	Ditto.
W. Bolt - -	Bodymaker -	Hooper and Co.
W. Hewitt -	Painter - -	Ditto.
T. McGrath -	Foreman - -	Peters and Sons.
J. Bolton -	Painter - -	Ditto.
I. M. Leader -	Manager - -	Laurie and Marner.
W. Frift - -	Bodymaker -	Wyburn and Co.
P. Hudry -	Foreman - -	Faurax.
Rousseau -	Smith - -	Delaye and Co.

HONORABLE MENTION

MR.
HOOPER
OF
CARLETON,
N.B.

Names	Occupations	Employers
Gen	-	Paris General Omnibus Com- pany.
Gutierrez	-	Ditto.
Gavarnier	-	Ditto.
Pierre Martin	-	Belvallet, Brothers.
Cassanese	-	Ditto.
W. Holt	-	Hooper and Co.
W. Hewitt	-	Ditto.
T. McGrath	-	Peter and Sons.
J. Bolton	-	Ditto.
E. M. Inader	-	Laurie and Martin.
W. F. H.	-	Wyburn and Co.
P. Hardy	-	Favre.
Rossignol	-	Delays and Co.

REPORT on HARNESS and SADDLERY.—(Class 62.)—By
H. GÖSCHEN, Esq.

MR.
GÖSCHEN
ON
HARNESS
AND
SADDLERY.

THE manufacture of harness and saddlery, if not deserving of very special notice, presents nevertheless many points of interest to the public generally, and more particularly to military men belonging to the mounted branches of the service. The result of an engagement may be affected by the good or bad equipment of the cavalry and artillery; bad saddles mean sore backs; ill-adapted harness is loss of power; cumbersome harness waste of strength. Some progress has doubtless been made of late years in the manufacture of military saddlery, both as regards utility and design; but there is not great scope for invention or radical changes, and I think that the chief point towards which manufacturers and inventors should direct their attention is the greatest possible strength of their articles, combined with the utmost possible lightness, for the weight still put on a horse's back is immense.

Military
saddlery.

Captain Fenn, my colleague at the Exhibition, to whom I am indebted for a great deal of information, and whose long experience of saddlery in all its branches gives great weight to his opinion on the subject, lays much stress on the moral effect of harness, so to speak, on the horse. It is quite certain, as he says, that carefully fitted and adapted harness gives confidence to the horse not less than to his rider or driver. Badly-adjusted collars, useless flapping straps, shifting saddles or pads, give the horse uneasiness and nervousness, which are perhaps seldom thus accounted for; but in the matter of bits these remarks apply more particularly, for the bit is the medium of the rider's expression of his wishes or will. Most horses will go best on an ordinary bit with a moderately high port; for carriage horses in ordinary work I think even the port may be dispensed with. The excessively severe and powerful bits used in Egypt and the East, and of which there are many curious specimens in those departments in the Exhibition, would excite our horses at home to madness, and engender timidity and viciousness of various kinds. The small barbs and Arabs trained to cut a circle on a dining-room table become accustomed to those bits, and are generally ridden with a very light hand, but the use of them is exceptional, and they are for general purposes and certainly for European horses useless. Of course a runaway horse must

Captain
Fenn.

Harness.

Bits.

MR.
GÖSCHEN
ON
HARNESS
AND
SADDLERY.

Hooks.

be bitted with whatever will hold him, and Captain Fenn showed me an Egyptian bit of peculiar construction, something like a Segunder bit, with which he broke the jaw of an incurable bolter, which could be stopped by nothing else. Another important point to which attention should be directed is the invention of some system by which horses may be quickly released from their harness and carriage, or gun, &c., in case of accidents. Captain Fenn, himself an ingenious inventor, tells me that nothing satisfactory has as yet been devised. A variety of hooks on the traces, attached either to the harness or to the carriage, have been invented and tried, but nothing has as yet proved completely satisfactory. Many of these hooks may be seen in the various departments of harness at the Exhibition.

With these few remarks, intended to bring into notice the chief points that have suggested themselves to us as deserving study and attention, I proceed to the examination of the different "exhibits." This report being intended to be very brief, and to serve simply as a guide-book to the various stalls in which any novelties of invention or useful designs are to be found, it will be sufficient to enumerate only those exhibitors (and I regret to say there are very few) who have submitted anything specially worthy of attention to the notice of the public. It is, fortunately, beyond my province to draw any comparisons between the competitors; in justice to the English exhibitors, I may, however, be permitted to make one remark; in estimating how near the French come to us or how far they go beyond us in the manufacture of saddles, it must be remembered that the best pigskins are imported from England.

France.

FRANCE.

The jury on class 62, being composed of two Frenchmen, one Russian, and one Englishman, the French exhibitors have, perhaps, naturally absorbed a goodly number of the prizes. But I am bound to say that the workmanship of the French saddlers seems generally equal to that of ours, and the materials, subject to the remark I have already made about pigskins, apparently as good also. Without trials it is difficult to judge of the strength and durability of harness. Leather varies very much, according to the process and time of tanning, and I can therefore only refer to what I was able to see, not to what I am in a position positively to know. This applies equally to inventions, the merits or defects of which it was, of course, impossible to test.

M. Hermes exhibits an invention of a new noseband, which is attached to ordinary bridles, and is intended for longeing horses, without the cumbersome apparatus now in use. He exhibits also an ingenious invention of longeing harness.

M. Adeline has invented a ventilating-saddle panel, which seemed to us as useless as it must be uncomfortable to the rider. No horseman could possibly ride on such a saddle for any length of time; and a well-built saddle should afford even more ventilation to the horse's back than that invented by M. Adeline.

M. Cogent's stall is well deserving of careful and more attentive notice. This report being necessarily brief, I will not attempt to describe the new system of equipment which he proposes to introduce into the French cavalry, but will merely recommend anyone interested in the matter to purchase and examine the pamphlet sold at his stall, in which may be found a minute description of all his inventions, some of which, particularly one of military iron saddles, are extremely ingenious. How they would answer in practice cannot, as I have already observed, be determined without a trial.

M. Martin's ornamental buckles, &c., executed in enamel, are pretty, but absolutely worthless.

M. Garnier proposes doing away with the buckle of the trace altogether, it being made shorter (though it can never be made longer again) by cutting it at one end and attaching a screw-clip to it, with a ring or hook to fasten it in the usual manner to the splinter-bar. The invention is of no value—witness the parenthesis.

MM. Goirand, Planchenault, Huron, Serey, Pincon, and Falour exhibit a variety of expanding and opening collars, which are worth looking at to study more their defects than their merits. My opinion, confirmed by Captain Fenn, is that a collar, as also a saddle-tree, should be firm, not to say rigid. All harness intended to be pliable, and which gives with every motion of the horse, is apt to rub and gall him when any weight or strain is put upon it. Moreover, a collar that opens at the bottom, or even at the top, though that is safer, is liable to get opened by accident, by a blow, by a variety of ways—especially when only fastened by a pin, as in M. Planchenault's collar. The object of them is, of course, to release a horse quickly when he is down; and I have heard that they are in use in Paris and work satisfactorily, but I regret not having had an opportunity of judging for myself, and, as a rule, I feel sure that they are unsafe and unpractical.

MR.
GÖSCHEN
ON
HARNESS
AND
SADDLERY.

The shape of the hames exhibited by the Compagnie Générale des Omnibus deserves attention, as showing their admirable adaptation to heavy strains.

M. Allin exhibits an ingenious, if not particularly useful, invention of a substitute for buckles. I may describe it as a boxclip, with a pin in the lid which goes through the holes in the straps when the clip is shut down, and entirely encloses the leather. It looks rather heavy, and has no special merit.

M. Trebutien exhibits some expanding and hinged stirrups.

M. Brassart exhibits a saddle with an excellent contrivance for carrying a pistol in the knee-pad, instead of in a wallet or holster.

French
collars.

As a general remark, I may add that the shape of the French collars is generally very good; the brass, steel, and ornamental work quite equal in appearance to ours as a rule; and the workmanship, in most cases, excellent. In most respects the system of harness is very similar to ours, breeching being, indeed, the only point on which opinions can well differ. I do not mention breast collars, as they are condemned almost unanimously. I cannot help thinking that the shape of English saddles is rather better than that of the French; in other respects, very little if any difference can be detected.

England.

ENGLAND.

There is, unfortunately, so little novelty exhibited by English manufactures that this portion of my report will be briefer than I could have wished. There exists no doubt in my mind that, if they choose, our saddlers need yield the palm to none. Material, workmanship, and shape are all excellent; but so are the French. It remains for our harness and saddlery manufacturers to take the lead in invention and design.

Mr. Bliss's collection of horse-clothing is very good, and worthy of notice. In this article, I think, we are not to be surpassed.

Mr. Blackwell's collection of patents, amongst some very beautiful harness, is deserving of attention, though a great many of his inventions are already well known, especially to Paris, as he has an agent there for the sale of them. His fomenting apparatus is extremely useful, especially for hot climates; but in all gutta-percha applications there is always the fear that, unless great care is taken, climate will affect them. Mr. Blackwell affirms that his preparations of gutta-

percha are specially made for every kind of temperature, and there is no doubt that he is a most painstaking, practical, and experienced saddler. The dumb jockeys he exhibits are of peculiar construction, having a whalebone down the centre of the gutta-percha to prevent the breaking of the latter through brittleness by frost, &c. It is an excellent though not very new invention; sections of it, as also of many other ingenious apparatus, are shown; and his stall may well demand a somewhat more lengthened notice.

Mr. Haynes's collection of saddle-trees is well worth looking at for excellence of finish and material.

I regret that the remainder of the English competitors cannot be more particularly distinguished. There are good whips, spurs, saddles, and harness exhibited, no doubt; but when I have said that I have said enough.

I may group into one class the exhibits from Africa and the East, Tunis, Morocco, Algeria, Egypt, Turkey, Bombay, and Bengal. The magnificence of some of the embroidery would probably have entitled them to a prize in another class; as saddlery, under the regulations laid down by the Imperial Commission, they can have, of course, no chance in competition. There are several specimens of European-fashioned saddles, with native embroidery, which show very good workmanship, and are signs of progress. Cawnpore harness is already much used in India. It looks well, is very cheap, and really very fairly good. The war departments of the various countries having by consent withdrawn from competition for prizes, I need only say that the English and Austrian exhibits—especially the latter—of military equipment are most deserving of attention.

Africa, &c

SWITZERLAND.

Switzerland.

There is a somewhat remarkable, and, I imagine, to most people, new invention of a collar exhibited by an officer of the Swiss Artillery well worth looking at, if the visitor can only find it. It is in one of the buildings in the park. The so-called collar is simply two pads connected by a strap at the top, and hanging almost loose on the shoulders of the horse. Herein lies its chief defect, though the exhibitor claims for it every conceivable advantage. The hames, shaped like a sword-scabbard and about as broad, slip into loops at the top and bottom of the pads, and there are a few straps connecting them, as far as I can remember, across the horse's chest. But a zealous French official prohibited me, although I displayed my badge of office, from taking a very accurate sketch, and I can only speak from a rough drawing

New collar.

MR.
GÖSCHEN
ON
HARNESS
AND
SADDLERY.
—

I took the liberty to make during our conversation. The collar is certainly unlike any other, and the Swiss Colonel declares that it works well. But I should be inclined, except for this declaration, to doubt it. It is, however, useful as an idea, even if not as a practical collar.

Spain.

SPAIN.

Carries off the palm by a most magnificent set of state harness, in which material, workmanship, taste, plating, and everything seem perfect. I may add that it is an eight-horse set of harness, and took, I understand, as many years to make. But this may be a fable. Spanish leather, or rather leather from certain parts of Spain, is celebrated.

Denmark.

DENMARK.

Mr. Taaning (S) a Horseus, of Jutland, exhibits a set of harness showing an ingenious principle of construction.

Italy. New
invention.

ITALY.

General Angelini exhibits an invention of some novelty to the general public; it consists of attaching a layer of gutta-percha tubes under the panels of saddles or the pads in harness, the object being to relieve the horse's back from dead pressure, and to interpose an elastic medium. It is also intended that the perspiration of a sweating horse should escape, so to speak, down the gutters made by the tubing. This invention is well worth looking at. Otherwise, Italian harness and saddlery are clumsy and inferior.

English
Colonies.

Our colonies exhibit little deserving of notice. Nova Scotia, represented by Mr. Chisholm, shows a very neat and good set of harness, with well-made, round leather traces. The Canadian saddlery is very indifferent, both as to material and workmanship, when compared with European manufactures; indeed, all colonial exhibits cannot bear comparison with those of more advanced countries, and it is open to question how far the system of awarding prizes by actual and not comparative merit works satisfactorily.

Conclusion.

In conclusion, I must be pardoned for omitting to mention the exhibitors of several countries, who, although showing articles of good material and workmanship, cannot be said either to excel or to bring anything novel to the notice of the public.

REPORT on FRUITS and VEGETABLES, DRIED or PRESERVED.—(Class 71.)—By ROBERT HOGG, LL.D., F.L.S.

DR. HOGG
ON DRIED
FRUITS
AND VEGE-
TABLES.

THIS class embraces all fruits and vegetables not included in class 72, and therefore contains all such as are in their natural condition, or are dried or preserved otherwise than with sugar.

Those who are interested in the study of these subjects will find throughout the various departments of the Exhibition ample opportunities of gratifying their taste and of extending their information; but it is much to be regretted that in too many cases the collections of foreign countries are not so useful and instructive as they might otherwise have been if the objects had been more generally named, and pains had been taken to furnish such information as would have enabled visitors to distinguish between the various objects exhibited. In the Portuguese and Italian departments, for example, there are immense collections of haricots, many of which are not generally known; but each variety is simply labelled "haricots," and no means are available for ascertaining the names by which to distinguish one from another. This is also particularly the case in the Algerian department, where there are collections of oranges and dried figs, not any of which are distinguished by names by which they might be identified.

Of the fruits in their natural condition, the collection which is the most attractive and interesting will be found in the Greek department. It consists of 53 distinct varieties of oranges, many of which are of great size and beauty, while others are peculiar either from their form or colour. The cultivation of oranges having of late years become a prominent feature in English horticulture, and the facility with which they may be ripened in the cheap glass-houses now so general in the country, a description of the leading varieties in this collection will prove highly useful, as there are few, if any, of them that already exist in our gardens.

The different kinds of oranges are divided into, 1, sweet oranges, or those of which the St. Michael's may be taken as the type; 2, bitter oranges, called by the French bigaradier, and of which the Seville orange is an illustration; 3, lemons; 4, citrons; 5, bergamottes, or limes; 6, shaddocks, or pampelmous; and 7, forbidden fruit. Among the sweet oranges, there are the St. Michael's, the blood orange of Malta, and

the elliptic or egg-shaped orange, all of which are familiar varieties. But there is a variety which surpasses them all, and is called China orange, or *προτοκαλλίον τῆς καλλαμάτος*, a large, handsome fruit, $3\frac{1}{2}$ in. in diameter, of a deep orange colour in the skin, which is smooth, like that of the St Michael's. In flavour this is the finest of all. Then there are the Genoa, a variety similar to the St. Michael's but with a coarser surface, and the sweet orange, Candia, both which are very excellent varieties. There is also a variety with a singular bossed surface, from which circumstance it is called *gibbosum*. The small flat variety, which we call in the fruiterers' shops in London the Tangierene, is here called the Manderine, or *Μανδανινιον*.

There is a great variety of the bigaradiers, or bitter oranges, many of which are singularly curious and ornamental. Of these the most striking are one called *Κρητικό νερανζί*, in Chios; *Φακουρα*, in Candy; and *Φραπονερανζο*, in Peloponnesus. It is from 4 in. to 6 in. in diameter, of a rich deep orange colour, and has a very rough, warted surface. The other is called *umbilicata*, and is also of large size, being $3\frac{1}{2}$ in. to 4 in. in diameter, of the flat shape of the manderine, and with the stalk and the apex deeply indented. A very beautiful variety of this class is a medium-sized fruit, finely striped, some being of a pale lemon colour with deep orange longitudinal bands, and others of a deep orange ground with pale lemon-coloured stripes. This is called "Hermaphrodite de Genois." There is a curious variety called *corniculata*, or horned orange, from horns growing out all round the upper part of the fruit. These horns are the points of the carpels, or "the quarters," of the fruit which have become detached and grown out, and departing from the normal form assume this singular appearance. There is a large fruit which, though it belongs to the class of bitter oranges, has a sweet flesh, and is called *Γλυκονερανζια* and *Νερανζια της Κως*; but one of the most remarkable is a very large pear-shaped variety, 6 in. to 8 in. long, with a rough, warted surface and uneven outline. It is called Bigaradier à gros fruit.

Lemons.

Of lemons there are not so many varieties; and those most worthy of notice are the Greek lemon *Σκαραμανκας της καρουστου*, an immense variety, $4\frac{1}{2}$ in. to 6 in. long; the "Deux Mammelons," also a large oval variety, with two great nipples, one at each end. The lemonier-bigarade is a hybrid between a lemon and a bitter orange, some being nearly round with an orange colour, while others are oval and of a pale lemon colour. There is a small egg-shaped variety, which has red flesh and variegated leaves, and this

is called λεμονι κοκκινον. The Naples lemon is a very small variety, about the size of a pigeon's egg, and is principally used for confitures. Then there is a sweet lemon, which is about the size of an ordinary lemon, but with a sweet flesh, and very agreeable.

The citron de leonide is a large, rough, warted variety, and is the only one of that kind exhibited.

The bergamottes or limes are more numerous. They are of the colour of a pale lemon, and rounder than that fruit usually is. The most remarkable in this class are two kinds of sweet lime, one called Ζαχαρολεμενον, which is a small, round, and rather oblate fruit, lemon-coloured, and with a large nipple at the end like a lemon; and the other Γλυκολεμενον, which is quite round, and of a deeper and more orange colour, and with not so large a nipple. The common bergamotte is that which furnishes the perfume known by that name, and which forms one of the principle ingredients in eau de cologne and other compounds of that class. There is also the aromatic lime of Chio, a small fruit of the size and shape of the Manderine orange, and has the same aromatic odour which that variety has, but is distinguished from it by being of a pale lemon colour and having an acid flesh. There are several specimens of the shaddock and the forbidden fruit, the latter being distinguished from the former in being pear-shaped, the former being round.

Oranges occur also in the Algerian and Italian departments; but, as they are not distinguished either by names or numbers, no reference can be made to them. Some of the specimens are very good, and among them may be observed a large fingered citron, the development of which is on the same principle as the horned orange, already noticed in the Greek department.

The dates in the Algerian department will form a good subject of study, particularly a collection of 14 varieties in boxes, all carefully named, and which come from the pepinières of Biskra. These vary in size, form, and colour, the last character varying from a pale brownish cream colour to an almost black. The variety usually met with in the shops of Britain attached to the rachis or stalk, in strings, is called "Beglet nour de Souf." These are generally covered with a saccharine glaze, as is also another and a much larger variety, also common in the grocers' shops and not attached to the stalks, called "Stima de Biskra." From the Algerian Government garden of acclimatization there are no less than 55 varieties; and from the "pepinières de Biskra" there is another collection of 54 varieties. These, for the most part, are small, dry, and farinaceous,

DR. HOGG
ON DRIED
FRUITS
AND VEGE-
TABLES.

many of them not larger than an olive; and it is these that form the staple food of the Arab population. All these varieties, it may be well to know, are varieties of *Phoenix dactylifera*, which is as fertile in producing varieties of fruit as our apple and pear are. In the Egyptian department there are also many varieties of dates, among which will be observed two varieties which form the large dry-skinned dates of our shops. These are called "Dattes de Dongolah" and "Dattes Hamry de Belbeis et Salanieh." There is also a variety which has no stone, and is called "sans noyau;" and, if imported into commerce, would doubtless prove acceptable from that circumstance.

Dried figs.

Dried figs are an important feature in the Algerian, the Italian, the Portuguese, and the Turkish departments. Here, again, it is much to be regretted that no names or numbers are attached to the different varieties, so as to afford some index as to the sorts that are usually employed for drying; and the persons in charge of these departments are perfectly ignorant on the subject. It will, therefore, be permissible only to observe the various forms in which they are made up. Some of these are sufficiently curious, as, for example, those impaled on wooden skewers, like larks for the spit. Some are pressed into shallow frames made of *Arundo donax*; others are squeezed in masses, like thick sections of a Stilton cheese; while others are made to resemble squares of Windsor soap or German sausages. There is a mode of making up figs exhibited in bottles, which consists in cutting two fruits longitudinally as far as the stalk, then spreading them out and applying the two inner surfaces to each other; in this form the fruit is dried, and in drying the two surfaces adhere, and they are then mounted on skewers or strung on a cord. The same fancies in the way of packing may be observed in the other collections; but in no case are there any exhibitions of those large, handsome figs which are to be obtained in the shops of the United Kingdom.

Almonds.

Almonds are well represented in the Italian, Algerian, and Portuguese departments. The Jordan almonds may there be seen under the names of "Sultana" and "Della Dama;" while the other sweet and bitter kernelled varieties will be found under their various names.

Other dried
or natural
fruits.

The other kinds of dried or natural fruits that are exhibited are dried apples, raisins, mulberries, pistachios, and pignons, the latter being the kernel of the seed of the stone pine (*Pinus pinea*). In most of these countries the jujube is also shown. This is sold in Covent Garden market under the name of "japonicas," and with what reason it is impossible

to tell, it being the fruit of the *Zizyphus vulgaris*, a tree extensively grown in the south of Europe, where its fruit is dried, and serves as a winter dessert. It is from this fruit that the confection called "jujubes" receives its name, and which should consist of gum arabic and sugar dissolved in the decoction of this fruit, and then evaporated to its proper consistence; but, as made in this country, the fruit forms no part of the ingredient. In the Algerian department may be seen specimens of the lotos of the ancient Lotophagi, and which is the fruit of *Zizyphus lotus*; they are about the size of a cherry, and of a purplish colour. In the interior of Africa these are pounded in a mortar and made into cakes, which are eaten by the natives.

Preserved Fruits.—In the Algerian collection are good specimens of the fruit of *Carica papaya*, or papaw. This, when young, is used for sauce; and water impregnated with the juice acquires the property of rendering all sorts of meat steeped in it tender. The flesh of old fowls or other animals becomes tender when fed on the leaves and fruit, and joints of meat are prepared for cooking by being hung in the upper branches of the tree. There are also examples of *sechium edule*, or choko, which is now considerably grown in Algeria as a substitute for the potato. The only other fruits that are preserved are manderine oranges, peaches, and loquats, or Japanese medlars. In the Dutch department there are excellent examples of apricots, peaches, plums, cherries, and mulberries. Similar collections may be seen in the Bavarian department, and a very extensive collection is sent by the United States of America, consisting of pineapples, peaches, cherries, gooseberries, red and yellow tomatoes, plums, grapes, pears, Siberian crab, Lawton raspberries, barberries, whortleberries, quince, currants, and sweet corn. These are all preserved in spirit. Russia exhibits dried apples, pears, prunes, and melons cut in slices.

Preserved
fruits.

is said to be the fruit of the *Nixophora* *volcanica*, a tree
extensively grown in the south of France, where its fruit is
dried and serves as a winter dessert. It is from this tree
that the candian called "jajibes" receives its name, and
which should consist of gum arabic and sugar dissolved in
the decoction of this fruit, and then evaporated to its proper
consistency; but as made in this country, the fruit forms no
part of the ingredient. In the Algerian department may be
seen specimens of the lotus of the ancient botanists, and
which is the fruit of *Nixophora* *lotus*; they are about the size
of a cherry, and of a purplish colour. In the interior of
Africa these are pounded in a mortar and made into cakes,
which are eaten by the natives.

Preserved Fruits.—In the Algerian collection are good
specimens of the fruit of *Cordia* *alliodora* or *peruviana*. This
when young is used for sauce; and water impregnated with
the juice cures the property of rendering all sorts of meat
excepted in its tender. The flesh of old fowls or other animals
becomes tender when fed on the leaves and fruit, and joints
of meat are prepared for cooking by being hung in the upper
branches of the tree. There are also examples of *echinops*
edible, or chole, which is now considerably grown in Algeria
as a substitute for the potato. The only other fruit that
are preserved are mandarin oranges, peaches, and pomegranates,
or *Japanese* *melons*. In the Dutch department there are
excellent examples of *apricots*, *peaches*, *plums*, *cherries*, and
mulberries. Similar collections may be seen in the Russian
department, and a very extensive collection is sent by the
United States of America, consisting of pineapples, peaches,
cherries, gooseberries, red and yellow tomatoes, plums, grapes,
pears, *Siberian* *cranberries*, *Larson* *raspberries*, *barberries*, *whortles*,
hawthorn, *quince*, *currants*, and *sweet corn*. These are all
preserved in spirit. Russia exhibits dried apples, pears,
peaches, and melons cut in slices.

In the collection of the Asiatic Society of London, there are
specimens of the fruit of the *Nixophora* *volcanica*, a tree
extensively grown in the south of France, where its fruit is
dried and serves as a winter dessert. It is from this tree
that the candian called "jajibes" receives its name, and
which should consist of gum arabic and sugar dissolved in
the decoction of this fruit, and then evaporated to its proper
consistency; but as made in this country, the fruit forms no
part of the ingredient. In the Algerian department may be
seen specimens of the lotus of the ancient botanists, and
which is the fruit of *Nixophora* *lotus*; they are about the size
of a cherry, and of a purplish colour. In the interior of
Africa these are pounded in a mortar and made into cakes,
which are eaten by the natives.

REPORT on FERMENTED DRINKS (Wines, Spirits, &c.)—
(Class 73.)—By E. L. BECKWITH, Esq.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

IN submitting the following report on the wines, spirits, ales, cider, and vinegar exhibited at the Exposition Universelle, Paris, I deem it my duty to preface the report itself by a few observations germane to the general subject.*

I must point out, in the first place, that were I to confine myself to recording any material progress which has taken place since 1862, the period of the last Exhibition, in the mode of culture or in the treatment and manufacture of the products exhibited, my labours would be very light, for on these heads there is little or nothing of novelty or importance to communicate. I gather, too, from the instructions with which I have been furnished that it is not your wish that I should prepare a thoroughly exhaustive report on wines, &c., as a document of that nature will probably be furnished by the Imperial Commission, at the termination of the Exhibition. I conceive, therefore, that I shall be best carrying out your wishes and intentions in adopting the following plan. I propose to give a generalised sketch of the trade in fermented drinks, more especially of that portion represented by wines, with a view of calling the attention of the public at large to a topic to which the conditions of modern civilisation are giving every year greater importance, and I shall endeavour to awaken an interest in the minds of those who will read this paper, by giving a brief account of the sources from which we have hitherto drawn our supplies of wine; of their properties, peculiarities, and characteristics; of their highest and lowest prices; and of the average quantities produced. Nor, while endeavouring to supply a succinct and comprehensive view of my subject, which might be of interest and service to the casual visitor to the Exhibition itself, shall I cease to bear in mind your recommendations to avail myself of the actual occasion in order to consider the future of the wine trade in England:—how it may best be promoted and most favourably developed;

Preliminary
remarks.

* The importance of the department of "Fermented Liquors" in the Exhibition may be estimated by the simple fact that there are 7,700 exhibitors, and 22,000 samples shown.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

and how, ultimately, its steady and judicious extension may become an instrument for good, morally, physically, and commercially.

FRANCE.

France.

In the cultivation of the vine, and in the production and manufacture of wines, France has long stood pre-eminent. I naturally, then, elect to place the wine growths of the French empire first on my list; nor shall I be accused, it is to be hoped, of undue partiality if (as a subject for discussion) I give the *pas* to the universally known and as universally admired champagne.

Champagne.

The distinctive appearance and flavour of this wine are known to all the world. Technically, its characteristics are great "elegance" and fruitiness, without excessive sweetness. Its effervescence should not be too rapid, and should form corruscating bubbles rather than a smooth froth on the surface. The *bouquet* should be suggestive rather of a delicate dryness than of a cloying sweetness. It is erroneous to assume that champagne does not require keeping after being landed in England. It may not be necessary to lay it by for any very considerable period; yet it is certainly susceptible of ripening; and I know few wines that show more improvement after the repose of one or two years. This opinion will, I think, be shared by those who have been fortunate enough to taste lately champagne of the vintage of 1857, landed in England, say, in 1861. It should not be retained in cases, but the bottles should be kept in a cool place, with good ventilation.

Designations.

Champagne is known by the names of the houses by whom it is manufactured, rather than by the vineyards where it is grown. There are some "growths," however, which are deservedly famous; such as those of Ay, Verzenay, and Boazy. Of Sillery—the title of another growth, and which is familiar to most English ears—there is little or none genuine. Most of the wine is made from red grapes; but some houses mix the juice of white grapes with the red, with a view of imparting additional flavour to it, white grapes being, as a rule, more aromatic than red.

Divergence
of opinion
as to wine.

Before attempting any definition in detail of the peculiar properties of wines as they regard our health, I may observe that a great dissimilarity of opinion prevails on this point. The dicta of the illustrious Liebig on wines are well known, but they have not been left uncontested; and I may mention, as an item of personal experience, that, on

MR.
BECKWITH
ON
FERMENTED
DRINKS.
—

consulting Dr. Spies, of Frankfort, on the subject, he informed me, in answer to numerous and carefully prepared questions and suggestions, that after many years' study and experience he could only arrive, as a result, at one conclusion—that "all good wine was good, and "all bad wine bad." The question obviously remains, What is good, and what is bad?—a query as difficult to resolve as what is wit or what is taste, although any person of cultivated intelligence can pronounce, without much danger of falling into error, as to what is tasteful and what witty.

To return to champagne. The French (who might certainly be assumed the fairest critics of their own staple) and the majority of Continental nations—to which must be added the Americans—prefer a very sweet champagne. In some cases, as much as one-fifth of the whole volume of the wine should be, to suite the Continental taste, simply syrup. In England, on the contrary, champagne containing one-tenth of pure saccharine matter is considered sweet; and many Englishmen would be better pleased if the per-centage amounted only to one-twelfth. A moderated sweetness I hold to be more wholesome; and an aversion to excess of saccharine is, I think, indicative of good taste; but it is exceedingly difficult to judge champagne by the standard of other wines. It is, to a great extent, "non-natural," and a manufactured and too often sophisticated article. Natural wine should have gone through the entire ordeal of fermentation; but the very fact of the effervescence of champagne proves that the fermentation has still to be completed; and this transition state, although rendering it very agreeable, detracts from its wholesomeness. It may here be remarked that this state of effervescence or incomplete fermentation is created in Germany by a process different from that resorted to in France. In the latter country the wine is bottled *before* the natural fermentation is accomplished, the time for bottling being in the spring following the vintage. In Germany the wine is allowed to ferment to the fullest extent. How much or how little sugar is required to augment the natural sweetness of the wine having been afterwards ascertained, the requisite quantity of syrup then is added to each bottle, and the wine is then placed in a heated room and forced into a further fermentation. Which of these two modes should be considered the least objectionable I must leave others to determine. It is a very significant fact touching the quality of the syrup introduced into champagne, that the

Fermenta-
tion.

Addition of
syrup.

Alcoholisa-
tion of
champagne
for the
English
market.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

sweetening for wine intended for the English market is prepared with brandy, while that for France and the Continent is made with wine. The former, naturally, is of increased strength; but this increase is at the expense of the bouquet, and is, very probably, injurious to digestion. I have been able to compare, on the spot, at Rheims, the champagnes destined for the different markets. That for England was almost destitute of the subtle and delicate flavour of the French, at the same time displaying an augmentation of coarse and unwholesome strength. I am reluctant to believe that the taste of the classes who in England habitually drink champagne is so vitiated as to induce a preference for a fiery and over alcoholised product. Nay, I rather incline to think that, were the finer and gentler article more extensively introduced, it would be more largely patronised than the "fortified" wine; but, rightly or wrongly, we have gained a reputation for addictedness to heady and potent drinks, and a bad name once acquired is with difficulty lost.

Medicinal
qualities of
champagne.

The medicinal qualities of champagne I must leave to be dilated upon by the faculty. There can be no doubt, however, that its value as a medicine is year after year more largely acknowledged by medical men. It often supersedes—or, at least, supplements—brandy in keeping up the system in cases of extreme exhaustion. It is frequently prescribed in acute sea-sickness; and I can personally vouch for its wonderfully revivifying powers and its faculty of retention on the stomach when no other liquid could be retained. To its general exhilarating properties, to its gentle stimulus, to the innocent cheerfulness it promotes, all civilized mankind can bear testimony; but these remarks apply strictly and solely to good champagne. Than bad champagne nothing can possibly be imagined more injurious to health—it is poison.

Proper time
of drinking.

Our English habits and customs differ, again, from those of France as to the time and mode of drinking champagne. The French usually take it excessively iced and towards the end of dinner; while in England it is *not* preferably drunk in a state of coolness approaching frigidity, and it is served at the commencement or towards the middle of the repast. I conceive that we are in the right as to the conditions of temperature in which we take champagne, but that we grossly err in imbibing it at the beginning of our meals; for, after partaking of champagne, it becomes extremely difficult, if not impossible, to do justice to more natural wines.

The price of wines in the champagne district, prior to being bottled and when quite young, varies from 1s. 2d. to 4s. 6d. per gallon, and, when bottled, from 1s. 5d. to 2s. 6d. per bottle.*

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Prices and
quantities.

The average quantity produced is fifty-two millions of gallons.

Burgundy.

Arriving next at the consideration of burgundy, it may be useful to remember that the principal vineyards in this splendid district are Romanée Conti, Clos-Vougeot, Richebourg, Chambertin (which is said to have been the favourite wine of Napoleon I.), La Tache, Corton, Beaune, Volnay, and Pommard. Of white Burgundy wines we have Mont Rachet (which some critics declare to be the finest of white French wines), Meursault, and, lastly, Chablis, which is grown more to the north, in the department of the Yonne. Nor must I omit to name the excellent Moulin-à-Vent, a very delicate wine from the department of the Saône-et-Loire. There are also Macon and Beaujolais, both sound and "honest" wines, although without much distinctive character.

Designa-
tions.

To describe all the peculiarities of burgundy would occupy far too much time, and by far exceed the space to which I am confined; nor do I think it would serve any useful purpose to enumerate the multitudinous divisions and subdivisions adopted by the French in their classification of this favourite wine. "Extremes meet," and we find the passion of the French for infinite division met at the opposite extreme by the well-nigh barbarous simplicity of the Portuguese, who give the generic name of "port" to all their wines. I may remark, however, that, although apparently coarser—that is to say, more robust than the wines of Bourdeaux—the growths of Burgundy are, indeed, very delicate, and will *not* bear sea voyages without suffering deterioration in quality. So, at least, say the French.

Characteris-
tics.

Burgundy in former years acquired an ill-name, which I cannot think deserved. It has been declared heady, fiery, gouty, and apoplectic. Recently, however, wine-drinkers in

Unjust
charges
brought
against Bur-
gundy.

* As the prices I shall name in this report may possibly convey a wrong impression, I think it advisable to explain at the outset that wine, when sold at these quotations, is still on its first lees, and the cost of package is not included, consequently there exists but little analogy between the cost as it then appears and that to which we, as consumers, are accustomed. Nor do I consider it within my province to provoke any such comparison, my duty being, I undertake it, solely to estimate the relative prices of the various exhibiting countries and districts, and for that purpose prime cost is the fairest test. I shall purposely avoid all allusion to quotation of wine when ready for consumption, for unless accompanied by full explanations I know of no more uncertain and fallible guide than a bare quotation of figures.

MR.
BECKWITH
ON
FERMENTED
DRINKS.
—

England seem to have awakened to the fact that Burgundy—like salmon at a Greenwich dinner—has been made the scapegoat for many sins, which should not with justice be laid at its door. I am satisfied that were burgundy taken on its merits and treated with fairness, were it imbibed in moderation *at* dinner and not *after*, its unpleasant repute as a heater of the blood and a provoker of gout and plethora would very soon disappear. I admit it cannot be taken with so much freedom as claret; but I am of opinion that the public would act wisely in occasionally varying their orders, and in requesting their wine merchants to alternate the light claret wines with cheap and wholesome burgundy. They will find it “stouter,” and possessing a more aromatic flavour. As regards the medium and higher qualities of burgundy, I cannot conscientiously place them in the exalted position which some would confer on them. Without wishing to decry their powerful bouquet, their full, ripe, and rich body, their beautiful colour, and their stimulating and invigorating qualities, it is but just to observe that they cannot with safety be quaffed from “goblets;” that they are more “serious” than “gay,” and “clever” rather than “cheerful” companions.

Prices and
quantities.

The lowest price in the Burgundy district for wines at the vintage is about 7*d.* per gallon. The highest qualities sometimes reach 17*s.*

The average annual quantity grown is 75,000,000 of gallons.

Claret or
Bordeaux
wine.

Claret, or, as it is termed on the Continent, “Vin de Bordeaux,” is, of all French wines, the best known in England; and its high repute is assuredly deserved. It is grown in the department of the Gironde. The wines are divided very minutely into different classes; and it is a proof of how carefully and faithfully the division was originally made that, although, in some few cases (owing to the care taken by the proprietor in the cultivation of his vines), the boundary lines have been partially obliterated, these boundaries are still, in the majority of instances, perfectly well defined and easy of recognition. It is scarcely necessary to give the names of all the classed Bordeaux wines. There are many very excellent growths which are not even classed at all; but I may mention cursorily such wines of the first class as Château Margaux, Château Lafite (and not Lafitte, as it is usually spelt), Château Latour, and Haut Brion; of the second class, Mouton, Leoville, Rausan, La Rose, and Cos d’Estournel; of the third class, Giscours, Lagrange, Langoa, Boyd Cantenac; of the fourth class,

Designa-
tions.

St. Pierre, Duluc, Duhard; of the fifth class, Grand Puy, Cantemerle, Cos Labory, and Batailley.

It is not so very long since the difficulty in obtaining Château Margaux and Château Lafite was attributed to the so-called fact of the produce of the vines being sold many years in advance to various European potentates. The Emperor of the French, the Emperor of Russia, the King of Prussia, the Pope, &c., were all represented as "accapareurs" of high-class clarets. Analogous stories are related with reference to Havannah cigars; but, as regards the wine trade I believe all these "forestalling" tales to be fables. Any person, however private or obscure he may be, can, if he have a sufficient command of money, buy up every year, during the vintage, as much first-class claret as he desires. That it may not be very easy to obtain, at a later period, a sufficient quantity of the *first growths* in a *genuine state*, I readily admit; and without wishing to assert anything which might cause offence to the merchant princes of Bordeaux, it is notorious that there is openly sold every year at least one hundred times as much Château Lafite and Château Margaux as is actually produced. I believe this to be much more the result of vicious habit than of a desire to defraud; yet very many highly respectable firms, whose integrity is otherwise unimpeachable, and who would scorn to descend to the small chicaneries of trade, do not scruple to sell as Château Lafite and Château Margaux wines which they know perfectly well do *not* proceed from those vineyards. They may plead that in this they are only following immemorial custom; but the custom is, I think, extremely reprehensible, and should be abandoned. Far better would it be if the wine merchants of Bordeaux, following the example of their brethren at Oporto and Cadiz, completely sunk the individuality of the vineyards, and trusted to the good repute, for honesty and rectitude of purpose, of their own names. The public who are now suffered to wander in a very labyrinth of deceit would very soon discover and fix upon for patronage the best shippers, whose names would become "household words." Nor would this change of system fail to redound to the advantage of the shipper himself. He would be unfettered in his choice of growths. He would have to look only to quality; he could buy cheaper, and he could even profitably sell at a much lower rate, wines of a much better quality than are now in the market. As matters are managed at present the product of some vineyards is just as absurdly over-estimated as that of others is unjustly under-valued.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

—
Erroneous
ideas about
claret.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Properties
and charac-
teristics.

The properties and peculiarities of claret are too numerous and too elaborate to be particularized in a report of which brevity is an essential. Those who have lately tasted a fine '48 need no other guide or illustration as to what is almost "perfect" in wine. Those who are not connoisseurs in claret would not easily be enabled, from any description, to realise an idea of its beauties. Its colour, for instance, is difficult (even in these days of new hues) of definition. It is, in fact, "claret colour" and nothing else. To define an odour is a task equally if not more onerous, and I can think of nothing closer to convey a notion of the bouquet of claret than a combination of raspberries and violets. The "body" is round, fruity, and soft as satin; and all the components are so happily blended into an homogeneous whole that, during the "degustation" of good claret all the senses seem to be simultaneously gratified. It is not, however, merely as a sybaritic luxury that I would wish claret to be known. Higher praise may be accorded to it as one of the most refreshing, the most cooling, and the most invigorating of beverages, easy of digestion, and even assisting that process; a mildly stimulating and inebriating drink, in every way fulfilling its Scriptural character as a "wine that maketh glad the heart of man."

Prices and
qualities.

Commencing at as low a price as 1s. per gallon, the growths, in their crude state, may rule as high as 25s.

Eighty-five millions of gallons are grown in this district, which also includes the white wines of Sauterne. Château Yquem is pre-eminently the best of these, and is noticeable in good years for its exquisitely dulcet and delicate flavour. Some of the other growths, such as Latour Blanche, are, to my taste, almost as excellent, and are even more wholesome and better suited to English tastes. They are dryer, and have equal flavour and body. The lighter wines of the Grave district are very "elegant," but are scarcely stout enough to become general favourites in England.

Vins d'Est.

Properties.

Vins d'Est.—Under this head I include all the wines grown in the department of the Haut Rhin, and along the eastern boundaries of France to the department of the Var. There are no growths bearing any particular names, nor do I find any of very special excellence. My experience of them at Strasbourg and elsewhere is that they are "hungry," thin, and ungenerous wines. Those of the Jura possess considerable bouquet, not unlike that of fine manzanilla, but their body is poor. I think, however, that were greater care bestowed upon them, some of the vins d'est

might turn out good wines. I have been shown some of the year 1774, and some of 1811, both still quite sound.

The lowest price is about 8*d.* per gallon, and the highest, not including the "straw" wine, is about 3*s.*

In these districts there is grown a considerable quantity of vin de paille, or "straw" wine. As it must be considered strictly as a vin de liqueur or dessert wine, I should scarcely deem it worthy of mention here, but for the peculiar mode of its manufacture. The grapes are allowed to remain on the vines a long time after they are ripe. They are then gathered and exposed for a certain period on straw, whence the name of the wine, until almost dry. They are then pressed and fermented in the ordinary manner; but in consequence of their long exposure they are, of course, very sweet, and will keep many years. Our home-made raisin wine is not unlike the vin de paille.

The quantity produced in this district is one hundred and twenty-seven million gallons.

The Vins du Midi embrace the wines grown in all the districts from the department of the Gard to that of the Eastern Pyrenees.

It is especially in this region that the "manufacture" and "imitation" of other wines is carried on. A very large export business is done at Cette, in Roussillon and other growths. The English consumer is not allowed to taste them in their pure and natural state; but they are first highly alcoholised, and then sent out under the spurious names of "French" port and sherry. Thus, injustice is done both to the Roussillon wines themselves and to those which they profess to imitate. The excuse urged for loading them with alcohol is that unless brandy be added to them they will not bear the sea voyage; but as large quantities of Roussillon are exported in a perfectly natural state to the north of Europe, I hold that with proper care in the earlier stages of preparation this wine might be brought to England without any perceptible injury being inflicted upon it. Nor can I doubt that were such an exportation of "undoctored" Roussillon found practicable, a very wide and profitable field of enterprise would be opened to the English wine merchant. Luscious, powerful, and of a fine colour, the wines of the Herault, of St. George, of Montpellier, &c. are eminently suitable to our moist climate, and when mingled with water they form a smooth, sweet, and pleasant drink.

In this division, too, are manufactured the major part of the vins de liqueur of France. Many of them are nearly,

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Price.

Straw wine.

Quantity.

Vins du
Midi.

Imitation of
wines.
Roussillon.

Vins de
liqueur.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Quantity
and price.

Vins de
Table.

Various
growths.

Designa-
tions.

Quantity
and price.

Aggregate
of wine
production
in France.

if not quite, as good as the absurdly over-estimated "Imperial" Tokay, but their prices are very much lower.

The quantity of Vins du Midi produced is very considerable — nearly one hundred and twenty-six millions of gallons.

The price begins as low as 6*d.* per gallon.

Vins de Table.—These embrace the produce of the Rhône, Gers, Drôme, Loire, Seine-et-Oise, &c.

I employ the generic term of "Vins de Table" not as suggestive of any marked inferiority in these wines, but simply as contradistinctive to the Vins de Liqueurs or desert wines. And under this name of "Vins de Table" the remaining wines of France may be fairly embodied.

Among them are growths of great excellence. Some, indeed, might be classed as "very fine," including, as they do, the well-known Ermitage or Hermitage, as it is called in England. This vineyard is situated near Tain, and, I infer, derives its name from the estate on which it is grown having been first cultivated by the monks. Many vineyards throughout Europe owe their origin to a similar cause; but there is no need to jump to the conclusion that the monks of old were overweeningly attached to the good things of this life. The real reason may have been that the earliest monks were hermits and anchorites, and that their cells were generally built in sterile and rocky places where little could grow, and certainly nothing vegetable could flourish save the vine. White and red Hermitage are both admirable wines. Crose has also many good qualities; and in good seasons, there are few wines more delicious than Côte Rôtie. I may also mention the wine called Château Neuf du Pape, the various growths near Nismes and St. Peray. Many of these are eminently drinkable, although they rarely possess any extraordinary fragrance of bouquet. They are, however, extremely enjoyable and health-giving.

The quantity of vins de table produced is enormous. The average may be set down at three hundred and sixty-five millions of gallons. The price varies from 5*d.* to 8*s.* per gallon.

The importance, nay, the supremacy, of France as a wine-growing country may be estimated when we arrive at the aggregate of all the average quantities made. It amounts to no less than eight hundred and thirty-one millions of gallons, exclusive of one hundred and sixty-five millions of gallons annually distilled into brandy.

GERMANY.

MR.
BECKWITH
ON
FERMENTED
DRINKS.
—
Germany.

Admitting that there cannot possibly be any question as to the good qualities of the wines of this country, especially as regards its higher growths, I do not attribute quite the same importance to German wines as to those of certain other wine-producing districts, for the reason that no appreciable addition is likely to be made to its productive powers; and again from the fact that the smaller and cheaper wines of Germany are neither so suitable, so cheap, nor so good as those with which other countries supply us. Rhine wines, however, merit more than a mere passing remark, on account of the great skill and industry displayed in their production, and the high state of perfection to which the Germans have brought their vineyards. I have no hesitation in stating, as my deliberate opinion, that were one medal only to be awarded as a recompense to the exhibitor of the finest possible wine, illustrative of what nature, aided by industry and improved by science can effect, that medal should at once be awarded to Johannesberger. It is the Château Margaux of the Rhine, as the Steinberg is its Lafite. The best of the Rhine wines are all white. There is a red species, called Assmannshausen; but I have not met with any very remarkable specimens of it. The only red wine which I deem deserving of high commendation is the old Steinwein, grown near Wurtzberg; and this is excellent, both in body and flavour.

Wines of
of the
Rhine.

Johannes-
berger.

That the wines of the Rhine and the Moselle are more heating than those of France is indubitable. The fact is due, I apprehend, to the presence of more aromatic properties in the former than in the latter.

Moselle.

The capacity for durability of Rhine wines is astonishing. I tasted some last year, still in the cask, made in the year 1616, and which was even then perfectly sound.

Durability
of Rhine
wines.

It may not be out of place to warn purchasers who pay a very high price for Johannesberg that there is a marked difference between the qualities; Johannesberg Schloss is one wine, Johannesberg district is another. Still although the wine grown at the castle is incomparably the finest, and, in good years, exquisitely delicious, even its produce is occasionally poor. The same remark applies to Margaux clarets; those of the Château Margaux being of the very highest class, while the district Margaux—an area of much wider extent—produces both good and bad wines.

Qualities of
Johannes-
berg.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Quantities
and price.

Austria and
Hungary.

About forty-five millions of gallons are annually produced in the Zollverein, and the price varies between 2s. and 50s. per gallon.

AUSTRIA AND HUNGARY.

I have much gratification in drawing the attention of my countrymen to the wines of the Austrian Empire, not only on account of their quality—in which, albeit excellent, there is still much room for improvement—but because I think that for our own sakes, as well as for reasons of international policy, we should do our best to welcome and encourage all *new* producers of wine. I use “new” in a relative sense. The vineyards of Austria may be as ancient as any in Europe, but it has only been within a very recent period that these wines—with the exception of tokay, which is a mere exotic luxury—have become known in England.

Character-
istics.

The peculiarity of Austrian wines consists—not as in France, where there are scarcely any two growths alike—in their widespread and almost unvarying similarity—a similarity so monotonous that at last it nauseates. As yet the cultivation of the vine in Austria, if such a figure of speech be permissible, is a pure democracy. There are no Imperial or Royal wines; for here, as I have already hinted, I cannot accord sovereign rights to tokay. It is simply a *vin de dessert*, or to be taken with cake at a morning call.

Tokay.

Vöslau
wines.

The best Austrian white wine is, in my opinion, that grown at the Gumpoldskirchen, between Vienna and the village of Baden-bei-Wien; and the red wines of Vöslau are certainly equal, if not superior, to any other red wines which Austria proper can produce; whilst Hungary is best represented by the rich and high flavoured red wine of Ofen (Buda).

Quantities
and prices.

The quantity annually grown, including the product of the kingdom of Hungary, is five hundred millions of gallons. The price varies from 6d. to 2s. 6d. per gallon.

Deceptions
in Hunga-
rian wines.

I should scarcely be fulfilling my duty while commenting on the wines of the Austrian Empire where I not to enter a protest against the inordinately high prices demanded in some cases for Hungarian wines in England. High-sounding titles are given to wines whose original producers were entirely ignorant of their illustrious paternity. Such a wine is “cabinet;” such another is “own grown;” and, on the principle of “fine feathers making fine birds,” a correspondingly high price is asked. I can only say that

no such dignified growths are known in the country where they are said to be grown. The price of wine in Hungary is throughout exceedingly moderate; and it is really an insult to the intelligence of the English people thus to trifle with them. There is little to wonder at, seeing with what facility we are duped, in our character for good taste being held so cheap by foreign nations.

ITALY.

The Italian peninsula should, of all European countries, from its admirable position and unequalled conditions of climate, be the most favourable to the cultivation of the vine, and Italy should have gained long since, as a wine-growing country, a renown as permanent and as profitable as that enjoyed by France. I need scarcely say that I am referring in this regard strictly to modern times; for, were even the most transient survey taken of the fascinating field of antiquity, we should see that the Campanian, the Umbrian, and the Tuscan wines were deservedly famous centuries before the vineyards of Gaul were ever heard of; and that they retained their celebrity for a lengthy period, during which, although the Gallic wines were known, they were despised as poor and spiritless.

Italy.
Advantages
of geograph-
ical posi-
tion and
climate.

The wines of modern Italy are said to be deficient in "staying" qualities, and this has been dwelt upon as an argument for the frequent dissonance of theory with fact. I would submit, however, that the criticisms passed on modern Italian wines might be modified did we more frequently take into consideration the carelessness, and sometimes almost total neglect, in which the vines are reared. Indeed, the sight of an Italian vineyard and an Italian vintage may awaken a sensation of astonishment that even such good wine as is really made should come out of such a place and under such difficulties. The vines are generally planted on level plains, and are intermingled with other and the most strangely assorted vegetable produce, whereby they are deprived of their full sustenance. They are trained from tree to tree in wreaths, most picturesque to look upon, and thus obtain only the downward rays of the sun, losing those which, striking the earth, are refracted upwards—a double advantage which is secured to low-trained vines planted on slopes and terraces. In fine, they never become so well or so evenly ripened as the wines of France and Germany.

Properties
and charac-
teristics.

Mode of
culture.

Those who are acquainted with the Ghem and Buanza wines of Lombardy; with the Broglio, the Chianti, and

Designa-
tions.

MR.
BECKWITH
ON
FERMENTED
DRINKS.
—

Probable
improve-
ment in
production.

the Monte-pulciano of Tuscany ; with the Capri of Naples, and the Barolo of Piedmont, will gladly testify to the excellence of these and many other Italian growths, possessing, as they do, good colour, purity, flavour, and sufficient fruitiness and body. Could the Italian agriculturist only be encouraged—in lieu of being discouraged, as he now is, by ruinous fiscal imposts—to grow good instead of inferior wines, the wine product of Italy would, I have not the slightest doubt, be gladly welcomed and highly esteemed in England. I have not relied solely on my own personal experience and observation in adducing this opinion, and I am glad to strengthen it with the authority of the Marchese General Emile Bertone di Sambuy, President of the Agricultural Association of Turin, by whom I am assured that Italian wines could easily be made to bear transport by sea without the use of alcohol ; and he is willing at any time to submit to our Board of Trade two samples of every kind of Italian wine so prepared.

Sicilian
wines.

In the Italian wines are included those of Sicily ; and I may remark, *en passant*, that the wine drunk in Italy under the name of marsala differs very widely, both as to strength and flavour, from that to which we have been accustomed in England.

Quantities
and prices.

I am unable to furnish any definite information as to the annual yield of the Italian vineyards or the price of wines. The consolidation of the kingdom of Italy has been of too recent a date for this department of agricultural statistics to be accurately edited. The prices, I may nevertheless observe, are very low, and the quantity is capable of being increased to an indefinite extent.

SPAIN.

Spain.

Those who have supposed that in drinking sherry they had become conversant with the wines of Spain must be prepared for a complete revolution in their pre-conceived ideas when they visit the Exhibition of 1867 ; for by far the greater number of wine exhibitors come from parts of the peninsula very remote indeed from the sherry of Xeres districts. The region in which sherry properly so called is produced is situated not far from the port of Cadiz, and is about 12 miles square ; but there can be no doubt that vast quantities of wines from other districts are brought in for the purpose of mixing with the genuine product, the normal price of the latter being very much in advance of that of the ordinary wines.

Locality of
production
of sherry.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Designa-
tions.

Errors in
nomencla-
ture.

Quantities.

Here, as in Champagne, the wine is known by the name of the shippers, and not by that of the vineyard. This plan I have already stated to be the most beneficial to the consumer; for, independently of the deservedly high character of the merchants of Cadiz and Puerta Santa Maria, their brands bear so high and almost so historical a value that they dare not attach them to an inferior article, and they thus hold themselves morally responsible for every cask of wine that leaves their warehouses. It is to be regretted, however, for the sake of the shippers themselves, that they should indifferently denominate all the white wines of Spain as "sherry," for it cannot be doubted that when the facilities of communication increase, and when locomotion is more general in Spain—as it now promises every day to become—we shall begin eagerly to seek not only the wines of Andalusia, but those of Valentia and Granada to the south, and of Catalonia and the Castiles to the north. There is not the slightest reason why as many varieties of Spanish, as of French or Italian, wines should not be brought to light; but at present the resources of the Spanish vineyards are "things of Spain," of an equally cloudy nature to most things relating to this "terra incognita" of European civilization. That French wines should be broadly divided into burgundies and clarets, although there may be 200 varieties of vin de Bourgogne, and as many, or more, of vin de Bordeaux, is perfectly feasible. The difference between them is as marked as that which exists between satin and velvet; but to call by one invariable title the entire produce of an entire country of vast extent, and whose climate varies according to its conformation from Siberian asperity to African sultriness, is most unjust, and even more provocative of confusion than that practice, which I have already reprehended, of subdividing the growths of a district into well nigh infinitesimal classes.

The quantities of wines shipped from Cadiz can easily be ascertained by reference to the Board of Trade returns, but we are utterly without information as to the aggregate yield of the Spanish vineyards. This yield is, however, known to be enormous; and the bounty of nature in this respect is the more remarkable when we bear in mind the extreme temperance of the Spanish people, who, except the lower classes in a few seaports, are all but as abstemious as Mohammedans. The abundance of the *vino del pias*, or common wine of the country, may be judged from the fact that (casks and cooperage being expensive) when new wine is required to be put into the cask that of

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Character-
istics.

the preceding year is occasionally poured down the gutters of a town, and that—notably at Val de Penas—common wine is sometimes used instead of water for mixing with mortar.

It is far from easy to describe all the characteristics of sherry, so much depends upon taste and fancy, and in the fact of the shippers keeping “soleras,” or reserved wines, by an admixture of which they can produce almost every variety of colour and flavour. Without setting up an arbitrary standard, which I consider to be all but impossible, I will throw out, however, as a general hint, that sherry should be soft without being sweet; fruity to the taste while in the mouth, but leaving the palate quite clean; that it should be invigorating but not heating; and that as regards hue, it should be of a decided straw colour. If it possesses these qualities the epicure may rest fairly contented; albeit, in some few and minor particularities, such, for instance, as gradation of tint, the opinions of the very best judges may differ.

PORTUGAL.

Portugal.

I approach the wines of Portugal, although I must necessarily be very brief in my notice of them, with considerable reluctance; for ever since I have heard or known anything of port wine it has formed a theme for controversy. It seems to be impossible to arrive at a satisfactory conclusion whether this notable and potent wine is a friend or foe to the human frame. Disputants are as unable to agree as to the desirability of drinking it as they are as to whether it should be sweet or dry, and among merchants themselves the argument has run high, and seems as far as ever from a definite solution. The trade in port wine commenced at the end of the 17th century in a spirit of unfairness towards France, whose manufactures, for political reasons, it was thought desirable to discourage. Every one has heard of the “Methuen” treaty, which, early in the 18th century, still further widened the commercial breach between England and France, pledging us, as it did, to an almost exclusive consumption of port wine, Portugal, on her side, agreeing to admit our woollen goods at reduced duties. The contest between port and claret thus commenced has continued ever since, although of late years the status of the combatants has been equalized by the reduction of duties on French wines.

Within the last few years the use of port has been, to a great extent, superseded by sherry, and at present it is suffering every day fiercer and fiercer opposition on the part of the wines of France; indeed, unless the shippers consent to make very radical alterations in their mode of preparation port will soon sink to the third rank in the hierarchy of wines. It is scarcely, perhaps, my province in such a paper as the present to enter into any discussion, but I think that I should in justice refer to the last report of Mr. Consul Crawford, and notice that portion in which he states that the wines of France are always mixed with spirit prior to exportation. This (the "French port" always excepted) is not the case. Mr. Crawford deduces from the supposed fact an apology for the employment of alcohol in port, adding that, owing to the writings of the late Baron Forrester, the consumption of port wine in England has not progressed as other wines have done. These are the Baron's propositions as stated by Mr. Crawford:—

"1st. That port wine can be *made* without spirit, because French wine can be so made. 2nd. That the wine is shipped to England in an adulterated state"—propositions with which I should have thought most of those who are acquainted with the subject would agree.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Baron For-
rester on
port wine.

I believe I am right in stating that it was never contemplated by the late Baron Forrester that port should not have a slight quantity of alcohol added to it, *after* making, which is very different from the practice of impregnating the wine with alcohol *during the process of making*; and I cannot help thinking that had the Baron's suggestion been acted upon we should have been able to take our port in comfort and safety, and with something like pride. As it is, the fact that we have habitually drunk, or that we drink this potent wine has become almost a reproach, and the Englishman's fondness for port has made him a laughing-stock in the eyes of foreigners.

The wine known as port should be grown in the Alto Douro, but a vast quantity of other wines are brought in to be blended with it. In good years as much as 70,000 pipes have been made in the Douro district alone. The remarks on which I ventured in regard to Spain will also apply to Portugal, as to the error committed by the shippers in not exporting a variety of wines in lieu of one invariable and monotonous sort. Englishmen should have an opportunity to taste the wines of Estramadura, of Beira, and of Minho, which last are said not to be inferior to any grown in

Locality of
production.

MR.
BECKWITH
ON
FERMENTED
DRINKS.
—

the Peninsula. The consumer's taste would be pleased; Portugal might be virtually compensated for the fading away of her unfair monopoly; and the shipper would be benefited, for he would no longer be the bond-servant of the Alto Douro, and the slave of port and nothing but port, but would be enabled to go further a-field and buy his wines cheaper.

Character-
istics.

With regard to the characteristics of port, it may be stated that the presence of a modified "fruitiness" in it is an essential, but that it should *never* be sweet. Rich colour, firmness, homogeneousness, and a tendency to dryness without astringency will not fail to be among the qualities of good port wine. When, in addition to these, it has attained a ripe age, in bottle, and has acquired some bouquet, it is undeniably, whatever may be urged to the contrary, a noble and generous beverage, and, so long as Englishmen are Englishmen, will never fail to find admirers.

Unimpor-
tance of
other
sources of
supply.

With reference to the other countries which are exhibitors of wine, &c. in the Champ de Mars, it is obvious that they do not afford us the same amount of interest—if, indeed, any commercially—as sources of supply; and I therefore do not propose to enter into their consideration, in this place, separately; but shall notice them in their order as they appear in the Exhibition. For a similar reason, the general history and characteristics of our own fermented liquors being perfectly familiar to the public, I shall comment upon our beers, spirits, cider, &c., as I pass the departments in which they are stored.

Exhibition.

The exhibition of the wines and other beverages themselves can afford little or no direct instruction, for, with one or two exceptions, it consists simply of rows of bottles—many of them empty: and which would blush, if they could, at the fictions they were obliged to tell. One cannot be too frequently reminded here of the proverb that "all is not gold that glitters." In one notable instance of a sample being brought to us, literally hung round with medals, the wine, when tasted, was found so inferior that it was impossible even to classify it.

FRENCH WINES.

French
wines.

The display of French wines commences in the immediate vicinity of the Porte Rapp, and, as might be expected, is of great extent and most neatly and elegantly arranged. But there is absolutely no novelty. The old, well-known

premiers crus, or first growths, retain their ancient and honoured places at the head of French wines. I was disappointed to find that, with one or two exceptions, none of the great champagne houses have exhibited. I was informed that the fact of their reputation having been made was the reason for their so abstaining from participation in the world's congress; but I trust that my informant was in error. If the mere fact of having attained celebrity were, as a rule, to deter manufacturers from displaying their products, a long farewell must be bidden to universal exhibitions. Apart from the immediate commercial advantages derived from the publicity given to his wines, it should be the pride of the manufacturer to show to the utmost what his country can produce; and there is, moreover, much to be taught and much to be learned in all exhibitions which can scarcely fail to be mutually beneficial, both to exhibitors and to the community at large.

The display of Bordeaux wines is admirably arranged, being confined to the growth of 1864—a year that was fairly favourable to all districts. I was glad also to renew my acquaintance with some of the red wines of Lorraine, which I had tasted at Nancy. They are smooth, pleasant, and well flavoured, and very moderate in price. A very agreeable, sparkling wine, light and pure, and also made near Nancy, was exhibited; it is called *le vin de la côte des Chanoines*. Bordeaux.

Some of the brandies were very good, especially those of 1827 and 1832 shown by Bertandau, of Juillac le Coq, near Cognac. These were the best specimens I ever tasted. Cognac.

The iron bins and baskets employed in cellarage have long been in use in England. The only appreciable advance made in the manufacture of French wine is the subjection of wine intended for exportation to 60 deg. centigrade of heat. The exposure only continues for a few minutes, but the heat effectually destroys all germs of further fermentation, without, it is said, injuring the wine. Application of heat to wines.

BELGIUM.

Belgium exhibits no wine; but has a very fair show of beers, liqueurs, and spirits. The last named are very well made; but it is difficult to speak favourably of the beers. Belgium.

GERMANY.

Under this head I include Prussia and all the smaller States, as some of the latter have little or nothing to show in the shape of wine. All the German products are Germany.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Berlin
spirits.

Austrian
wines.

Borrowing
names.

Hungarian
wines.

Viennese
beer.

arranged with characteristic neatness of design. Bavaria of course shows her renowned beer, and carries off a gold medal; and the Rhine and Moselle wines, although not represented by the houses best known in England, well sustain their high reputation. The spirits made at Berlin can scarcely be praised too highly for their "cleanliness" and cheapness.

Austria, with which is included the kingdom of Hungary, makes a very extensive, and, on the whole, a very satisfactory show. In the centre of the former is a cask of enormous dimensions, exhibited by a merchant who is supposed to sell Hungarian wines. It is doubtful whether this is to be taken as an indication of the extremely friendly relations which now happily reign between Austria and Hungary; but the Magyar cask completely casts into the shade the modest but excellent wines of Vöslau close by, which seem quite overpowered by their gigantic neighbour.

I have already pointed out how undesirable it is for the younger wine countries, in their anxiety to introduce their wines to the English market, to borrow the names (and some are said to borrow the product likewise) of older English favourites. It may be in charity supposed that such a system has been adopted with a view to spare the English ear from hearing and the English mouth from pronouncing some extraordinary names borne by the less known wines, and of which I may take Tschwrtschenthaler as a sufficient specimen.

I was very pleased with some samples of wine from Marburg. These were fruity, and had good body. The red wines of Vöslau (exhibited by Mr. Schlumberger) are also worthy of most favourable note.

Those who know how admirably the business of the Messrs. Iälics, of Pesth, is conducted, how magnificent is their establishment, and how rapid have been their advances in the development of the wine manufacture, will be gratified to learn that they have again been honourably distinguished.

As a matter of course a prize for beer is likewise carried off by Vienna—a prize obviously merited by the exquisite brewing of their favourite German beverage. The Viennese may fairly be styled the Montilla of malt and hops. The worthy monks of Klosteneuberg will also rejoice to hear that their exertions have met with a fitting reward, and they may add the Paris Exhibition gold medal to the sumptuous collection of jewels in their treasure chamber.

SWITZERLAND.

Generally speaking, the wine grown in the Helvetic Confederation is very ordinary. Of the tolerable sorts I may mention that from Yvorne, situated to the north-east of the Lake of Geneva, and the sparkling Neufchâtel. As a rule the Swiss, as wine growers, must be admired more for the industry and perseverance they have shown than for any great result they have attained.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Switzerland.

SPAIN.

Spain exhibits, in a separate building in the Park of Spain. the Champ de Mars, her cereals, her wine, her oil, and her tobaccos. The entire collection is splendid.

In wines none of the great Cadiz houses exhibit; and although I made three distinct engagements to examine and report on any wines which might be unknown in the English market, not one of these appointments was kept. "To-morrow" (the historical *manana* of Spain) was always suggested as the time when I really should see them. I did happen to taste, by accident, some wines from Malaga and Catalonia. They appeared to be quite as alcoholic as any to which we have been accustomed in England, and were widely different from that which the reports of travellers had led me to expect.

Spain carries off eight gold medals as her share of prizes.

PORTUGAL.

Portugal makes but a very small show, and scarcely any attempt at display, or what the French term "installation," is essayed. I tasted one sample of port, fully fermented, but it was very dry and hard. Specimens of bucellas were, however, shown me, the which, I was assured, were wholly free from brandy, and the degustation confirmed the statement. It was a "pretty," pleasant, dryish wine, with a slightly bitter taste, but very agreeable to the palate. Surely if wines of this nature can be made as an exception, they could equally well be made as a rule. This bucellas was five years old, and perfectly firm and sound. The port shown by Rebello was also very good. He is almost the only Portuguese shipper who exhibits.

Portugal.

GREECE.

I was considerably disappointed in the examination of the wines of Greece. After the glowing accounts I had lately heard of them I was scarcely prepared to find santorin very light in body though of good bouquet,

Greek
wines.

MR.
BECKWITH
ON
FERMENTED
DRINKS.
—

England seem to have awakened to the fact that Burgundy—like salmon at a Greenwich dinner—has been made the scapegoat for many sins, which should not with justice be laid at its door. I am satisfied that were burgundy taken on its merits and treated with fairness, were it imbibed in moderation *at* dinner and not *after*, its unpleasant repute as a heater of the blood and a provoker of gout and plethora would very soon disappear. I admit it cannot be taken with so much freedom as claret; but I am of opinion that the public would act wisely in occasionally varying their orders, and in requesting their wine merchants to alternate the light claret wines with cheap and wholesome burgundy. They will find it “stouter,” and possessing a more aromatic flavour. As regards the medium and higher qualities of burgundy, I cannot conscientiously place them in the exalted position which some would confer on them. Without wishing to decry their powerful bouquet, their full, ripe, and rich body, their beautiful colour, and their stimulating and invigorating qualities, it is but just to observe that they cannot with safety be quaffed from “goblets;” that they are more “serious” than “gay,” and “clever” rather than “cheerful” companions.

Prices and
quantities.

The lowest price in the Burgundy district for wines at the vintage is about 7*d.* per gallon. The highest qualities sometimes reach 17*s.*

The average annual quantity grown is 75,000,000 of gallons.

Claret or
Bordeaux
wine.

Claret, or, as it is termed on the Continent, “*Vin de Bordeaux*,” is, of all French wines, the best known in England; and its high repute is assuredly deserved. It is grown in the department of the Gironde. The wines are divided very minutely into different classes; and it is a proof of how carefully and faithfully the division was originally made that, although, in some few cases (owing to the care taken by the proprietor in the cultivation of his vines), the boundary lines have been partially obliterated, these boundaries are still, in the majority of instances, perfectly well defined and easy of recognition. It is scarcely necessary to give the names of all the classed Bordeaux wines. There are many very excellent growths which are not even classed at all; but I may mention cursorily such wines of the first class as *Château Margaux*, *Château Lafite* (and not *Lafitte*, as it is usually spelt), *Château Latour*, and *Haut Brion*; of the second class, *Mouton*, *Leoville*, *Rausan*, *La Rose*, and *Cos d’Estournel*; of the third class, *Giscours*, *Lagrange*, *Langoa*, *Boyd Cantenac*; of the fourth class,

Designa-
tions.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

—
Erroneous
ideas about
claret.

St. Pierre, Duluc, Duhard; of the fifth class, Grand Puy, Cantemerle, Cos Labory, and Batailley.

It is not so very long since the difficulty in obtaining Château Margaux and Chateau Lafite was attributed to the so-called fact of the produce of the vines being sold many years in advance to various European potentates. The Emperor of the French, the Emperor of Russia, the King of Prussia, the Pope, &c., were all represented as "accapareurs" of high-class clarets. Analogous stories are related with reference to Havannah cigars; but, as regards the wine trade I believe all these "forestalling" tales to be fables. Any, person, however private or obscure he may be, can, if he have a sufficient command of money, buy up every year, during the vintage, as much first-class claret as he desires. That it may not be very easy to obtain, at a later period, a sufficient quantity of the *first growths* in a *genuine state*, I readily admit; and without wishing to assert anything which might cause offence to the merchant princes of Bordeaux, it is notorious that there is openly sold every year at least one hundred times as much Château Lafite and Château Margaux as is actually produced. I believe this to be much more the result of vicious habit than of a desire to defraud; yet very many highly respectable firms, whose integrity is otherwise unimpeachable, and who would scorn to descend to the small chicaneries of trade, do not scruple to sell as Château Lafite and Château Margaux wines which they know perfectly well do *not* proceed from those vineyards. They may plead that in this they are only following immemorial custom; but the custom is, I think, extremely reprehensible, and should be abandoned. Far better would it be if the wine merchants of Bordeaux, following the example of their brethren at Oporto and Cadiz, completely sunk the individuality of the vineyards, and trusted to the good repute, for honesty and rectitude of purpose, of their own names. The public who are now suffered to wander in a very labyrinth of deceit would very soon discover and fix upon for patronage the best shippers, whose names would become "household words." Nor would this change of system fail to redound to the advantage of the shipper himself. He would be unfettered in his choice of growths. He would have to look only to quality; he could buy cheaper, and he could even profitably sell at a much lower rate, wines of a much better quality than are now in the market. As matters are managed at present the product of some vineyards is just as absurdly over-estimated as that of others is unjustly under-valued.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Properties
and charac-
teristics.

The properties and peculiarities of claret are too numerous and too elaborate to be particularized in a report of which brevity is an essential. Those who have lately tasted a fine '48 need no other guide or illustration as to what is almost "perfect" in wine. Those who are not connoisseurs in claret would not easily be enabled, from any description, to realise an idea of its beauties. Its colour, for instance, is difficult (even in these days of new hues) of definition. It is, in fact, "claret colour" and nothing else. To define an odour is a task equally if not more onerous, and I can think of nothing closer to convey a notion of the bouquet of claret than a combination of raspberries and violets. The "body" is round, fruity, and soft as satin; and all the components are so happily blended into an homogeneous whole that, during the "degustation" of good claret all the senses seem to be simultaneously gratified. It is not, however, merely as a sybaritic luxury that I would wish claret to be known. Higher praise may be accorded to it as one of the most refreshing, the most cooling, and the most invigorating of beverages, easy of digestion, and even assisting that process; a mildly stimulating and inebriating drink, in every way fulfilling its Scriptural character as a "wine that maketh glad the heart of man."

Prices and
qualities.

Commencing at as low a price as 1s. per gallon, the growths, in their crude state, may rule as high as 25s.

Eighty-five millions of gallons are grown in this district, which also includes the white wines of Sauterne. Château Yquem is pre-eminently the best of these, and is noticeable in good years for its exquisitely dulcet and delicate flavour. Some of the other growths, such as Latour Blanche, are, to my taste, almost as excellent, and are even more wholesome and better suited to English tastes. They are dryer, and have equal flavour and body. The lighter wines of the Grave district are very "elegant," but are scarcely stout enough to become general favourites in England.

Vins d'Est.

Properties.

Vins d'Est.—Under this head I include all the wines grown in the department of the Haut Rhin, and along the eastern boundaries of France to the department of the Var. There are no growths bearing any particular names, nor do I find any of very special excellence. My experience of them at Strasbourg and elsewhere is that they are "hungry," thin, and ungenerous wines. Those of the Jura possess considerable bouquet, not unlike that of fine manzanilla, but their body is poor. I think, however, that were greater care bestowed upon them, some of the vins d'est

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Price.

Straw wine.

Quantity.

Vins du
Midi.

Imitation of
wines.
Roussillon.

Vins de
liqueur.

might turn out good wines. I have been shown some of the year 1774, and some of 1811, both still quite sound.

The lowest price is about 8*d.* per gallon, and the highest, not including the "straw" wine, is about 3*s.*

In these districts there is grown a considerable quantity of vin de paille, or "straw" wine. As it must be considered strictly as a vin de liqueur or dessert wine, I should scarcely deem it worthy of mention here, but for the peculiar mode of its manufacture. The grapes are allowed to remain on the vines a long time after they are ripe. They are then gathered and exposed for a certain period on straw, whence the name of the wine, until almost dry. They are then pressed and fermented in the ordinary manner; but in consequence of their long exposure they are, of course, very sweet, and will keep many years. Our home-made raisin wine is not unlike the vin de paille.

The quantity produced in this district is one hundred and twenty-seven million gallons.

The Vins du Midi embrace the wines grown in all the districts from the department of the Gard to that of the Eastern Pyrenees.

It is especially in this region that the "manufacture" and "imitation" of other wines is carried on. A very large export business is done at Cette, in Roussillon and other growths. The English consumer is not allowed to taste them in their pure and natural state; but they are first highly alcoholised, and then sent out under the spurious names of "French" port and sherry. Thus, injustice is done both to the Roussillon wines themselves and to those which they profess to imitate. The excuse urged for loading them with alcohol is that unless brandy be added to them they will not bear the sea voyage; but as large quantities of Roussillon are exported in a perfectly natural state to the north of Europe, I hold that with proper care in the earlier stages of preparation this wine might be brought to England without any perceptible injury being inflicted upon it. Nor can I doubt that were such an exportation of "undoctored" Roussillon found practicable, a very wide and profitable field of enterprise would be opened to the English wine merchant. Luscious, powerful, and of a fine colour, the wines of the Herault, of St. George, of Montpellier, &c. are eminently suitable to our moist climate, and when mingled with water they form a smooth, sweet, and pleasant drink.

In this division, too, are manufactured the major part of the vins de liqueur of France. Many of them are nearly,

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Quantity
and price.

Vins de
Table.

Various
growths.

Designa-
tions.

Quantity
and price.

Aggregate
of wine
production
in France.

if not quite, as good as the absurdly over-estimated "Imperial" Tokay, but their prices are very much lower.

The quantity of Vins du Midi produced is very considerable — nearly one hundred and twenty-six millions of gallons.

The price begins as low as 6*d.* per gallon.

Vins de Table.—These embrace the produce of the Rhône, Gers, Drôme, Loire, Seine-et-Oise, &c.

I employ the generic term of "Vins de Table" not as suggestive of any marked inferiority in these wines, but simply as contradistinctive to the Vins de Liqueurs or desert wines. And under this name of "Vins de Table" the remaining wines of France may be fairly embodied.

Among them are growths of great excellence. Some, indeed, might be classed as "very fine," including, as they do, the well-known Ermitage or Hermitage, as it is called in England. This vineyard is situated near Tain, and, I infer, derives its name from the estate on which it is grown having been first cultivated by the monks. Many vineyards throughout Europe owe their origin to a similar cause; but there is no need to jump to the conclusion that the monks of old were overweeningly attached to the good things of this life. The real reason may have been that the earliest monks were hermits and anchorites, and that their cells were generally built in sterile and rocky places where little could grow, and certainly nothing vegetable could flourish save the vine. White and red Hermitage are both admirable wines. Crose has also many good qualities; and in good seasons, there are few wines more delicious than Côte Rôtie. I may also mention the wine called Château Neuf du Pape, the various growths near Nismes and St. Peray. Many of these are eminently drinkable, although they rarely possess any extraordinary fragrance of bouquet. They are, however, extremely enjoyable and health-giving.

The quantity of vins de table produced is enormous. The average may be set down at three hundred and sixty-five millions of gallons. The price varies from 5*d.* to 8*s.* per gallon.

The importance, nay, the supremacy, of France as a wine-growing country may be estimated when we arrive at the aggregate of all the average quantities made. It amounts to no less than eight hundred and thirty-one millions of gallons, exclusive of one hundred and sixty-five millions of gallons annually distilled into brandy.

GERMANY.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Germany.

Admitting that there cannot possibly be any question as to the good qualities of the wines of this country, especially as regards its higher growths, I do not attribute quite the same importance to German wines as to those of certain other wine-producing districts, for the reason that no appreciable addition is likely to be made to its productive powers; and again from the fact that the smaller and cheaper wines of Germany are neither so suitable, so cheap, nor so good as those with which other countries supply us. Rhine wines, however, merit more than a mere passing remark, on account of the great skill and industry displayed in their production, and the high state of perfection to which the Germans have brought their vineyards. I have no hesitation in stating, as my deliberate opinion, that were one medal only to be awarded as a recompense to the exhibitor of the finest possible wine, illustrative of what nature, aided by industry and improved by science can effect, that medal should at once be awarded to Johannesberger. It is the Château Margaux of the Rhine, as the Steinberg is its Lafite. The best of the Rhine wines are all white. There is a red species, called Assmannshausen; but I have not met with any very remarkable specimens of it. The only red wine which I deem deserving of high commendation is the old Steinwein, grown near Wurtzberg; and this is excellent, both in body and flavour.

Wines of
of the
Rhine.

Johannes-
berger.

That the wines of the Rhine and the Moselle are more heating than those of France is indubitable. The fact is due, I apprehend, to the presence of more aromatic properties in the former than in the latter.

Moselle.

The capacity for durability of Rhine wines is astonishing. I tasted some last year, still in the cask, made in the year 1616, and which was even then perfectly sound.

Durability
of Rhine
wines.

It may not be out of place to warn purchasers who pay a very high price for Johannesberg that there is a marked difference between the qualities; Johannesberg Schloss is one wine, Johannesberg district is another. Still although the wine grown at the castle is incomparably the finest, and, in good years, exquisitely delicious, even its produce is occasionally poor. The same remark applies to Margaux clarets; those of the Château Margaux being of the very highest class, while the district Margaux—an area of much wider extent—produces both good and bad wines.

Qualities of
Johannes-
berg.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Quantities
and price.

Austria and
Hungary.

Character-
istics.

Tokay.

Vöslau
wines.

Quantities
and prices.

Deceptions
in Hunga-
rian wines.

About forty-five millions of gallons are annually produced in the Zollverein, and the price varies between 2s. and 50s. per gallon.

AUSTRIA AND HUNGARY.

I have much gratification in drawing the attention of my countrymen to the wines of the Austrian Empire, not only on account of their quality—in which, albeit excellent, there is still much room for improvement—but because I think that for our own sakes, as well as for reasons of international policy, we should do our best to welcome and encourage all *new* producers of wine. I use “new” in a relative sense. The vineyards of Austria may be as ancient as any in Europe, but it has only been within a very recent period that these wines—with the exception of tokay, which is a mere exotic luxury—have become known in England.

The peculiarity of Austrian wines consists—not as in France, where there are scarcely any two growths alike—in their widespread and almost unvarying similarity—a similarity so monotonous that at last it nauseates. As yet the cultivation of the vine in Austria, if such a figure of speech be permissible, is a pure democracy. There are no Imperial or Royal wines; for here, as I have already hinted, I cannot accord sovereign rights to tokay. It is simply a *vin de dessert*, or to be taken with cake at a morning call.

The best Austrian white wine is, in my opinion, that grown at the Gumpoldskirchen, between Vienna and the village of Baden-bei-Wien; and the red wines of Vöslau are certainly equal, if not superior, to any other red wines which Austria proper can produce; whilst Hungary is best represented by the rich and high flavoured red wine of Ofen (Buda).

The quantity annually grown, including the product of the kingdom of Hungary, is five hundred millions of gallons. The price varies from 6d. to 2s. 6d. per gallon.

I should scarcely be fulfilling my duty while commenting on the wines of the Austrian Empire where I not to enter a protest against the inordinately high prices demanded in some cases for Hungarian wines in England. High-sounding titles are given to wines whose original producers were entirely ignorant of their illustrious paternity. Such a wine is “cabinet;” such another is “own grown;” and, on the principle of “fine feathers making fine birds,” a correspondingly high price is asked. I can only say that

no such dignified growths are known in the country where they are said to be grown. The price of wine in Hungary is throughout exceedingly moderate; and it is really an insult to the intelligence of the English people thus to trifle with them. There is little to wonder at, seeing with what facility we are duped, in our character for good taste being held so cheap by foreign nations.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

ITALY.

The Italian peninsula should, of all European countries, from its admirable position and unequalled conditions of climate, be the most favourable to the cultivation of the vine, and Italy should have gained long since, as a wine-growing country, a renown as permanent and as profitable as that enjoyed by France. I need scarcely say that I am referring in this regard strictly to modern times; for, were even the most transient survey taken of the fascinating field of antiquity, we should see that the Campanian, the Umbrian, and the Tuscan wines were deservedly famous centuries before the vineyards of Gaul were ever heard of; and that they retained their celebrity for a lengthy period, during which, although the Gallic wines were known, they were despised as poor and spiritless.

Italy.
Advantages
of geograph-
ical posi-
tion and
climate.

The wines of modern Italy are said to be deficient in "staying" qualities, and this has been dwelt upon as an argument for the frequent dissonance of theory with fact. I would submit, however, that the criticisms passed on modern Italian wines might be modified did we more frequently take into consideration the carelessness, and sometimes almost total neglect, in which the vines are reared. Indeed, the sight of an Italian vineyard and an Italian vintage may awaken a sensation of astonishment that even such good wine as is really made should come out of such a place and under such difficulties. The vines are generally planted on level plains, and are intermingled with other and the most strangely assorted vegetable produce, whereby they are deprived of their full sustenance. They are trained from tree to tree in wreaths, most picturesque to look upon, and thus obtain only the downward rays of the sun, losing those which, striking the earth, are refracted upwards--a double advantage which is secured to low-trained vines planted on slopes and terraces. In fine, they never become so well or so evenly ripened as the wines of France and Germany.

Properties
and charac-
teristics.

Mode of
culture.

Those who are acquainted with the Ghem and Buanza wines of Lombardy; with the Broglio, the Chianti, and

Designa-
tions.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Probable
improve-
ment in
production.

the Monte-pulciano of Tuscany ; with the Capri of Naples, and the Barolo of Piedmont, will gladly testify to the excellence of these and many other Italian growths, possessing, as they do, good colour, purity, flavour, and sufficient fruitiness and body. Could the Italian agriculturist only be encouraged—in lieu of being discouraged, as he now is, by ruinous fiscal imposts—to grow good instead of inferior wines, the wine product of Italy would, I have not the slightest doubt, be gladly welcomed and highly esteemed in England. I have not relied solely on my own personal experience and observation in adducing this opinion, and I am glad to strengthen it with the authority of the Marchese General Emile Bertone di Sambuy, President of the Agricultural Association of Turin, by whom I am assured that Italian wines could easily be made to bear transport by sea without the use of alcohol ; and he is willing at any time to submit to our Board of Trade two samples of every kind of Italian wine so prepared.

Sicilian
wines.

In the Italian wines are included those of Sicily ; and I may remark, *en passant*, that the wine drunk in Italy under the name of marsala differs very widely, both as to strength and flavour, from that to which we have been accustomed in England.

Quantities
and prices.

I am unable to furnish any definite information as to the annual yield of the Italian vineyards or the price of wines. The consolidation of the kingdom of Italy has been of too recent a date for this department of agricultural statistics to be accurately edited. The prices, I may nevertheless observe, are very low, and the quantity is capable of being increased to an indefinite extent.

SPAIN.

Spain.

Those who have supposed that in drinking sherry they had become conversant with the wines of Spain must be prepared for a complete revolution in their pre-conceived ideas when they visit the Exhibition of 1867 ; for by far the greater number of wine exhibitors come from parts of the peninsula very remote indeed from the sherry of Xeres districts. The region in which sherry properly so called is produced is situated not far from the port of Cadiz, and is about 12 miles square ; but there can be no doubt that vast quantities of wines from other districts are brought in for the purpose of mixing with the genuine product, the normal price of the latter being very much in advance of that of the ordinary wines.

Locality of
production
of sherry.

Here, as in Champagne, the wine is known by the name of the shippers, and not by that of the vineyard. This plan I have already stated to be the most beneficial to the consumer; for, independently of the deservedly high character of the merchants of Cadiz and Puerta Santa Maria, their brands bear so high and almost so historical a value that they dare not attach them to an inferior article, and they thus hold themselves morally responsible for every cask of wine that leaves their warehouses. It is to be regretted, however, for the sake of the shippers themselves, that they should indifferently denominate all the white wines of Spain as "sherry," for it cannot be doubted that when the facilities of communication increase, and when locomotion is more general in Spain—as it now promises every day to become—we shall begin eagerly to seek not only the wines of Andalusia, but those of Valentia and Granada to the south, and of Catalonia and the Castiles to the north. There is not the slightest reason why as many varieties of Spanish, as of French or Italian, wines should not be brought to light; but at present the resources of the Spanish vineyards are "things of Spain," of an equally cloudy nature to most things relating to this "terra incognita" of European civilization. That French wines should be broadly divided into burgundies and clarets, although there may be 200 varieties of vin de Bourgogne, and as many, or more, of vin de Bordeaux, is perfectly feasible. The difference between them is as marked as that which exists between satin and velvet; but to call by one invariable title the entire produce of an entire country of vast extent, and whose climate varies according to its conformation from Siberian asperity to African sultriness, is most unjust, and even more provocative of confusion than that practice, which I have already reprehended, of subdividing the growths of a district into well nigh infinitesimal classes.

The quantities of wines shipped from Cadiz can easily be ascertained by reference to the Board of Trade returns, but we are utterly without information as to the aggregate yield of the Spanish vineyards. This yield is, however, known to be enormous; and the bounty of nature in this respect is the more remarkable when we bear in mind the extreme temperance of the Spanish people, who, except the lower classes in a few seaports, are all but as abstemious as Mohammedans. The abundance of the *vino del pias*, or common wine of the country, may be judged from the fact that (casks and cooperage being expensive) when new wine is required to be put into the cask that of

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Character-
istics.

the preceding year is occasionally poured down the gutters of a town, and that—notably at Val de Penas—common wine is sometimes used instead of water for mixing with mortar.

It is far from easy to describe all the characteristics of sherry, so much depends upon taste and fancy, and in the fact of the shippers keeping “soleras,” or reserved wines, by an admixture of which they can produce almost every variety of colour and flavour. Without setting up an arbitrary standard, which I consider to be all but impossible, I will throw out, however, as a general hint, that sherry should be soft without being sweet; fruity to the taste while in the mouth, but leaving the palate quite clean; that it should be invigorating but not heating; and that as regards hue, it should be of a decided straw colour. If it possesses these qualities the epicure may rest fairly contented; albeit, in some few and minor particularities, such, for instance, as gradation of tint, the opinions of the very best judges may differ.

PORTUGAL.

Portugal,

I approach the wines of Portugal, although I must necessarily be very brief in my notice of them, with considerable reluctance; for ever since I have heard or known anything of port wine it has formed a theme for controversy. It seems to be impossible to arrive at a satisfactory conclusion whether this notable and potent wine is a friend or foe to the human frame. Disputants are as unable to agree as to the desirability of drinking it as they are as to whether it should be sweet or dry, and among merchants themselves the argument has run high, and seems as far as ever from a definite solution. The trade in port wine commenced at the end of the 17th century in a spirit of unfairness towards France, whose manufactures, for political reasons, it was thought desirable to discourage. Every one has heard of the “Methuen” treaty, which, early in the 18th century, still further widened the commercial breach between England and France, pledging us, as it did, to an almost exclusive consumption of port wine, Portugal, on her side, agreeing to admit our woollen goods at reduced duties. The contest between port and claret thus commenced has continued ever since, although of late years the status of the combatants has been equalized by the reduction of duties on French wines.

Within the last few years the use of port has been, to a great extent, superseded by sherry, and at present it is suffering every day fiercer and fiercer opposition on the part of the wines of France; indeed, unless the shippers consent to make very radical alterations in their mode of preparation port will soon sink to the third rank in the hierarchy of wines. It is scarcely, perhaps, my province in such a paper as the present to enter into any discussion, but I think that I should in justice refer to the last report of Mr. Consul Crawford, and notice that portion in which he states that the wines of France are always mixed with spirit prior to exportation. This (the "French port" always excepted) is not the case. Mr. Crawford deduces from the supposed fact an apology for the employment of alcohol in port, adding that, owing to the writings of the late Baron Forrester, the consumption of port wine in England has not progressed as other wines have done. These are the Baron's propositions as stated by Mr. Crawford:—

"1st. That port wine can be *made* without spirit, because French wine can be so made. 2nd. That the wine is shipped to England in an adulterated state"—propositions with which I should have thought most of those who are acquainted with the subject would agree.

Baron Forrester on port wine.

I believe I am right in stating that it was never contemplated by the late Baron Forrester that port should not have a slight quantity of alcohol added to it, *after* making, which is very different from the practice of impregnating the wine with alcohol *during the process of making*; and I cannot help thinking that had the Baron's suggestion been acted upon we should have been able to take our port in comfort and safety, and with something like pride. As it is, the fact that we have habitually drunk, or that we drink this potent wine has become almost a reproach, and the Englishman's fondness for port has made him a laughing-stock in the eyes of foreigners.

The wine known as port should be grown in the Alto Douro, but a vast quantity of other wines are brought in to be blended with it. In good years as much as 70,000 pipes have been made in the Douro district alone. The remarks on which I ventured in regard to Spain will also apply to Portugal, as to the error committed by the shippers in not exporting a variety of wines in lieu of one invariable and monotonous sort. Englishmen should have an opportunity to taste the wines of Estramadura, of Beira, and of Minho, which last are said not to be inferior to any grown in

Locality of production.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

the Peninsula. The consumer's taste would be pleased; Portugal might be virtually compensated for the fading away of her unfair monopoly; and the shipper would be benefited, for he would no longer be the bond-servant of the Alto Douro, and the slave of port and nothing but port, but would be enabled to go further a-field and buy his wines cheaper.

Character-
istics.

With regard to the characteristics of port, it may be stated that the presence of a modified "fruitiness" in it is an essential, but that it should *never* be sweet. Rich colour, firmness, homogeneousness, and a tendency to dryness without astringency will not fail to be among the qualities of good port wine. When, in addition to these, it has attained a ripe age, in bottle, and has acquired some bouquet, it is undeniably, whatever may be urged to the contrary, a noble and generous beverage, and, so long as Englishmen are Englishmen, will never fail to find admirers.

Unimpor-
tance of
other
sources of
supply.

With reference to the other countries which are exhibitors of wine, &c. in the Champ de Mars, it is obvious that they do not afford us the same amount of interest—if, indeed, any commercially—as sources of supply; and I therefore do not propose to enter into their consideration, in this place, separately; but shall notice them in their order as they appear in the Exhibition. For a similar reason, the general history and characteristics of our own fermented liquors being perfectly familiar to the public, I shall comment upon our beers, spirits, cider, &c., as I pass the departments in which they are stored.

Exhibition.

The exhibition of the wines and other beverages themselves can afford little or no direct instruction, for, with one or two exceptions, it consists simply of rows of bottles—many of them empty: and which would blush, if they could, at the fictions they were obliged to tell. One cannot be too frequently reminded here of the proverb that "all is not gold that glitters." In one notable instance of a sample being brought to us, literally hung round with medals, the wine, when tasted, was found so inferior that it was impossible even to classify it.

FRENCH WINES.

French
wines.

The display of French wines commences in the immediate vicinity of the Porte Rapp, and, as might be expected, is of great extent and most neatly and elegantly arranged. But there is absolutely no novelty. The old, well-known

premiers crus, or first growths, retain their ancient and honoured places at the head of French wines. I was disappointed to find that, with one or two exceptions, none of the great champagne houses have exhibited. I was informed that the fact of their reputation having been made was the reason for their so abstaining from participation in the world's congress; but I trust that my informant was in error. If the mere fact of having attained celebrity were, as a rule, to deter manufacturers from displaying their products, a long farewell must be bidden to universal exhibitions. Apart from the immediate commercial advantages derived from the publicity given to his wines, it should be the pride of the manufacturer to show to the utmost what his country can produce; and there is, moreover, much to be taught and much to be learned in all exhibitions which can scarcely fail to be mutually beneficial, both to exhibitors and to the community at large.

The display of Bordeaux wines is admirably arranged, being confined to the growth of 1864—a year that was fairly favourable to all districts. I was glad also to renew my acquaintance with some of the red wines of Lorraine, which I had tasted at Nancy. They are smooth, pleasant, and well flavoured, and very moderate in price. A very agreeable, sparkling wine, light and pure, and also made near Nancy, was exhibited; it is called *le vin de la côte des Chanoines*. Bordeaux.

Some of the brandies were very good, especially those of 1827 and 1832 shown by Bertandau, of Juillac le Coq, near Cognac. These were the best specimens I ever tasted. Cognac.

The iron bins and baskets employed in cellarage have long been in use in England. The only appreciable advance made in the manufacture of French wine is the subjection of wine intended for exportation to 60 deg. centigrade of heat. The exposure only continues for a few minutes, but the heat effectually destroys all germs of further fermentation, without, it is said, injuring the wine. Application of heat to wines.

BELGIUM.

Belgium exhibits no wine; but has a very fair show of beers, liqueurs, and spirits. The last named are very well made; but it is difficult to speak favourably of the beers. Belgium.

GERMANY.

Under this head I include Prussia and all the smaller States, as some of the latter have little or nothing to show in the shape of wine. All the German products are Germany.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Berlin
spirits.

Austrian
wines.

Borrowing
names.

Hungarian
wines.

Viennese
beer.

arranged with characteristic neatness of design. Bavaria of course shows her renowned beer, and carries off a gold medal; and the Rhine and Moselle wines, although not represented by the houses best known in England, well sustain their high reputation. The spirits made at Berlin can scarcely be praised too highly for their "cleanliness" and cheapness.

Austria, with which is included the kingdom of Hungary, makes a very extensive, and, on the whole, a very satisfactory show. In the centre of the former is a cask of enormous dimensions, exhibited by a merchant who is supposed to sell Hungarian wines. It is doubtful whether this is to be taken as an indication of the extremely friendly relations which now happily reign between Austria and Hungary; but the Magyar cask completely casts into the shade the modest but excellent wines of Vöslau close by, which seem quite overpowered by their gigantic neighbour.

I have already pointed out how undesirable it is for the younger wine countries, in their anxiety to introduce their wines to the English market, to borrow the names (and some are said to borrow the product likewise) of older English favourites. It may be in charity supposed that such a system has been adopted with a view to spare the English ear from hearing and the English mouth from pronouncing some extraordinary names borne by the less known wines, and of which I may take Tschwrtschenthaler as a sufficient specimen.

I was very pleased with some samples of wine from Marburg. These were fruity, and had good body. The red wines of Vöslau (exhibited by Mr. Schlumberger) are also worthy of most favourable note.

Those who know how admirably the business of the Messrs. Iälics, of Pesth, is conducted, how magnificent is their establishment, and how rapid have been their advances in the development of the wine manufacture, will be gratified to learn that they have again been honourably distinguished.

As a matter of course a prize for beer is likewise carried off by Vienna—a prize obviously merited by the exquisite brewing of their favourite German beverage. The Viennese may fairly be styled the Montilla of malt and hops. The worthy monks of Klosteneuberg will also rejoice to hear that their exertions have met with a fitting reward, and they may add the Paris Exhibition gold medal to the sumptuous collection of jewels in their treasure chamber.

SWITZERLAND.

MR.
BECKWITH
ON
FERMENTED
DRINKS.
—
Switzerland.

Generally speaking, the wine grown in the Helvetic Confederation is very ordinary. Of the tolerable sorts I may mention that from Yvorne, situated to the north-east of the Lake of Geneva, and the sparkling Neufchâtel. As a rule the Swiss, as wine growers, must be admired more for the industry and perseverance they have shown than for any great result they have attained.

SPAIN.

Spain exhibits, in a separate building in the Park of Spain. the Champ de Mars, her cereals, her wine, her oil, and her tobaccos. The entire collection is splendid.

In wines none of the great Cadiz houses exhibit; and although I made three distinct engagements to examine and report on any wines which might be unknown in the English market, not one of these appointments was kept. "To-morrow" (the historical *manana* of Spain) was always suggested as the time when I really should see them. I did happen to taste, by accident, some wines from Malaga and Catalonia. They appeared to be quite as alcoholic as any to which we have been accustomed in England, and were widely different from that which the reports of travellers had led me to expect.

Spain carries off eight gold medals as her share of prizes.

PORTUGAL.

Portugal makes but a very small show, and scarcely any attempt at display, or what the French term "installation," is essayed. I tasted one sample of port, fully fermented, but it was very dry and hard. Specimens of bucellas were, however, shown me, the which, I was assured, were wholly free from brandy, and the degustation confirmed the statement. It was a "pretty," pleasant, dryish wine, with a slightly bitter taste, but very agreeable to the palate. Surely if wines of this nature can be made as an exception, they could equally well be made as a rule. This bucellas was five years old, and perfectly firm and sound. The port shown by Rebello was also very good. He is almost the only Portuguese shipper who exhibits.

GREECE.

I was considerably disappointed in the examination of the wines of Greece. After the glowing accounts I had lately heard of them I was scarcely prepared to find santorin very light in body though of good bouquet,

Greek
wines.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

while the wine of Patras was very mediocre indeed, and that of Athens decidedly bad. I was informed that the Greeks were improving steadily in the manufacture of wines, and that, although they already produce from 60 to 70 millions of gallons annually, this yield might soon be very considerably increased.

RUSSIA.

Russia.

Crimean
wines.

Russia makes but a small display, but she has contrived to render it very complete. She exhibits wine, both dry and for dessert, together with beer and spirits; and her exhibition of sweetmeats is really quite captivating. The only descriptions of wines, however, grown on Russian soil, possessing any interest to the English consumer, are the white and red varieties from the Crimea, grown by Prince Woronzoff. The former are clean and dry, with a slight muscatel flavour and good body; the latter resembles very old port, bereft, however, of its strength. I should esteem these wines to be very suitable to our climate. I could not learn the precise quantities produced; but I am told the yield is plentiful.

ITALIAN WINES.

Italian
wines.

Notwithstanding an application on my part for information in this department, more than seven weeks after the opening of the Exposition the arrangements of the Italian section were still so far incomplete as to render it impossible for me to arrive at any satisfactory conclusion on the exhibition of Italian wines as a whole. The number of exhibitors is very large, and the wines shown are sufficiently varied; but, from all I could gather from extraneous sources, the samples exhibited fall very short of doing justice to the growths they are assumed to represent. Italy, even so far as the knowledge of her resources is concerned, is still in an undeveloped condition.

TURKISH WINES.

Turkish
wines.

In Turkey I found the *vins de liqueur* exhibited very good indeed, and very moderate in price. They are mainly fabricated in the island of Cyprus. The dry wines, or *vins de table*, grown in the Ottoman possessions—if the samples tasted are to be accepted as evidence of their quality—would seem fairly to justify the prohibition from wine imposed by Mahommed on his followers. They are decidedly to be avoided, both by Frank and Moslem. One red wine

appeared to have been mixed with liquorice; and a white specimen I tasted would scarcely have possessed any body or texture at all had it not been for some substance, resembling gum (possibly resin), suspended in it, and the presence of which was anything but agreeable to the palate.

AMERICAN WINES.

In the United States of America the show of wines is naturally very small; but I need only, in explanation, quote the terse remark of one of the United States Commissioners:—"We do not exhibit for the sake of selling, " but with the object of learning." Such being obviously the case, I shall be absolved from all imputations of unfriendliness in noticing the extreme sparseness of the wine product of North America. That the well-known "catawba," about which so much has been said, sung, and written, is a very "nice" wine few can deny. The Catawba grape has a defined flavour, which to many is delicious; but I do not think that full justice is done to the grape in its treatment under manufacture. The sparkling catawba has too much *mousse*, or frothiness, in lieu of coruscating effervescence about it. It is "full sweat," and shows some slight tendency to acidity; whilst dry catawba, although showing good bouquet, is deficient in the firmness and "roundness" inseparable from well-managed wines. In beers the great American Republic is doing very well indeed. It is unfortunate that the bitter ales manufactured by Messrs. Smith and Co., of New York, were lost during their voyage across the Atlantic; but their porters and strong ales can be tasted in excellent condition at the adjacent American restaurant, where also the "cock-tails," "eye openers," "phlegm cutters," and other curiosities of the American bar can be drunk in perfection.

BRAZILIAN WINES.

From the empire of Brazil but very little wine has hitherto come, but the cultivation of the vine, I am informed, is satisfactorily progressing. Some samples are exhibited made from green and ripe grapes. The former appeared very inferior, and I could discover little of the natural flavour of the grape in the latter, which rather resembled English "home-made" wine. Some "straw wine" from Rio de Janeiro, and another sample of the same kind from St. Paulo, evinced much higher qualities.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

South Ame-
rican wines.

SOUTH AMERICAN REPUBLICS.

In the South American Republics the only notable wine I found, and this was exceptionally deserving of notice, was a white wine from Lima, in Peru, called moquequa. It was soft, dry, and clean, but at present the annual growth does not exceed 40,000 gallons. This product, I am assured, is susceptible of a large increase. The price of moquequa is very moderate.

BRITISH COLONIES.

British co-
lonies.

As regards the colonial possessions of Great Britain, it should be a subject of gratification to all to find that the Cape of Good Hope has sent to the Paris Exhibition wine of such excellent quality as to elicit encomia even from the French jurors, usually so difficult to please in matters of taste. "Cape" wine has for a very long time been exposed to ridicule and detraction. "South African" sherries have been made the text of innumerable jests, now worn threadbare, and on the principle of "giving a dog a bad name" the stigma of opprobrium has been affixed to the vineyards of the Cape Colony, and the English public have grown perfectly ashamed of admitting that they could drink such a thing as Cape wine. The present display goes far to wipe out this foul blot on the South African scutcheon, and justifies us in the aspiration, that in the future the colony will be true to its name, and in the production of wines will be one of "Good Hope" indeed.

AUSTRALIA.

Australia.

Australia also shows considerable improvement in her wines; but owing to the heavy expense of freight, and the demand which exists in the country itself, many years must elapse before England can look for any extended supply from this quarter. Such indications of improvement as are manifest in the wine growths of the Australian colonies should, nevertheless, be cordially welcomed.

GREAT BRITAIN.

Great
Britain.

I finally approach the fermented liquors of Great Britain; and I must premise that we make no very prominent display in the Champ de Mars. Were a stranger, indeed, to argue solely from the fact of our meagre exhibit of those products, he might either laud us enthusiastically for our extreme temperance, or, not being of the total abstinence persuasion, he might censure us for the little care we bestowed upon

MR.
BECKWITH
ON
FERMENTED
DRINKS.

the liquid creature-comforts of life. That which we have shown in the way of alcoholic beverages in the Exposition Universelle cannot be regarded as evidence either of the extent of our productions or the proportion of our trade. Nineteen exhibitors only represent the whole of Great Britain in the departments of brewing, distilling, vinegar and cider making.

Porter, ale, cider, perry, vinegar.—Taking these serialim, I find that porter has been almost entirely neglected. None of the London brewers exhibit their manufactures in this article; but we have still no cause to be ashamed of the display made of our national beverage, beer. Never, perhaps, was the pale or bitter ale of Burton-on-Trent shown in finer condition or in greater general perfection, and I am glad to find that the international jury have shared the opinion I put forth, and have allotted two gold medals for beer to England, the other nations only taking one. One of these medals has been awarded to Messrs. Allsopp; the second is taken by Messrs. Bass.

Porter, ale,
cider, perry,
vinegar.

Not a single distiller of whisky makes his appearance; and Messrs. Underwood and Co. would alone represent English gin, were it not for Messrs. Boord and Son, whose celebrated "Old Tom" and liqueurs are vended at the refreshment buffet of Spiers and Pond; and Messrs. Dawn and Valentin's, whose liquors are sold by Bertram and Roberts. Messrs. Henley and Son (whose perry was much admired by the jury) divide with Messrs. Underwood the representation of vinegar, and with Mr. Fryer that of cider and perry.

Reforms in
the award-
ing of prizes

I have thus endeavoured, as briefly as was consistent with the nature of the matters examined, to consider the various products in Class 73. It now only remains for me to draw a few deductions from what I have seen, and to hazard a few suggestions thereupon.

Utility
Exhibitions.

The primary question suggested amounts, I apprehend, to this: Are exhibitions of any use? and, if so, in what lies their definite and practical utility? That the first part of this question must meet with a very general affirmative is obvious. The world has made up its mind that exhibitions, either general or sectional, are of great use to civilization; but while gladly admitting the postulate I may be allowed this reservation—that in what is called a "world's fair," completeness in every department is an imperative necessity. That department should not be admitted to distinctive exposition in which display was

MR.
BECKWITH,
ON
FERMENTED
DRINKS.

not made of the products of the leading manufacturers. Unless the most skilful and prominent representatives of a particular branch are present it is impossible that foreigners can form an adequate idea of our proficiency, or arrive at an impartial conclusion as to our merits. As well, indeed, might we exhibit a body without a head as a complete representation of the human form.

Prizes.

With regard to prizes, I hold medals, certificates, mentions, &c., to be legitimate instruments for good. That they may occasionally subserve the purposes of trade advertisement is a matter unworthy of notice, and one with which the donor at least has nothing to do; but they are of great value as an encouragement to industry and a recognition of merit. I may observe that many judicious friends of education have deprecated the prize system in schools, on the ground that undue emulation is thereby encouraged. Such objections do not hold with regard to trade and manufacture. There emulation cannot be too constant or too vigorous. The community is benefited in the end by increased cheapness and increased excellence.

Reforms in
the award-
ing of prizes.

I would suggest, however, that the better plan in granting prizes would be to award them for special rather than for general merits. Rules much more defined as they affect the conditions of reward should be laid down beforehand, and these rules should be compiled, or at least approved, by a committee of the trade whose performances are under judgment; for such a committee would know better than any stranger could do what was most sought after, what was most difficult of attainment in manufacture, and consequently most meritorious in accomplishment. For instance, adducing my own class as an example, there might be, I think, a gold medal for the cheapest wine; another for that which showed the greatest properties—stability or “keeping;” a third for that possessing the finest flavour; a fourth for fulness of body; and an extraordinary medal—a jewelled or enamelled one, if that were thought expedient, for the wine combining in itself the greater number of the qualities mentioned above. These prizes might be limited to certain countries or districts, or, on the other hand, they might be thrown open to all the world. As the distribution of rewards is at present conducted, one exhibitor, we will say, obtains a gold medal for the perfection of his product, thus receiving the distinction which he deserved; *but if to another exhibitor in the same class is awarded a precisely similar recognition* an appreciable injury must be done to the first-selected party. The distinctive value

of the prizes given diminishes in a corresponding ratio to their augmentation in number, until, in the end, the first recipient becomes unpleasantly alive to the conviction that he would have been in a position as good, if not better, had no medals at all been awarded. I would wish particularly to call attention to this point, as a case of especial hardship has come under my notice in this Exhibition owing to the present mode of distributing rewards.

With regard to the practical utility of the Exhibition of 1867 as throwing any light on wine or the wine trade, I may point out, not for the information of the erudite, but for those who desire to learn, that it has been proved by the experience of the wine-producing countries of antiquity that nature must always be indebted to art and to science—and that, too, in a very extensive degree—in the production of good wine; and that, however bounteous may be the yield of the soil, mere copiousness of production weighs little in the scale against skill, perseverance, and carefulness in manufacture. Exhibitions such as the present, then, enable us to ascertain with accuracy what nations have become, or are becoming, most proficient in the art of improving the gifts with which they have been endowed by Providence. We also awaken to the knowledge of new sources of supply of good, cheap, wholesome, and natural wines—priceless desiderata to a country like England, whose taste has been for more than a century systematically vitiated; and, as this is the age of commercial treaties, I can see no valid reason why we should not exchange vast quantities of the manufactures on which we pride ourselves for the products of countries with which we have hitherto done but little business. Finally, the results of the Exhibition of 1867 should stimulate manufacturers to greater exertions and should place the consumer in a position to discriminate for the future between that which is faulty and that which is really excellent.

Practical
results.

But how, it may be asked, are we to avail ourselves of the information thus acquired and turn it to profitable account? This is a question of most serious moment, and demands much more extended examination than I could possibly give it here. I may state, however, broadly, that we should adopt a new standard by which to test the quality of wine. We should seek for a beverage which could be *drunk*, and not merely sipped. We should look more to the legitimate quenching of thirst and the consequent refreshment of the frame, than to a refined kind of dram-drinking. We should drink our wine *with our food*,

MR.
BECKWITH
ON
FERMENTED
DRINKS.

and not separately ; and, did we adopt that course, I am persuaded that the liquor which appears almost acid to those accustomed to *vins de dessert* would become simply refreshing and appetising. And, finally, we should give ourselves a little more trouble about our wine. I have frequently heard it boasted that one of the chief advantages possessed by sherry over other wines was that it rather improved than deteriorated by being left open for a few days. Such a claim to distinction I cannot consider in any way complimentary to sherry ; and, without wishing to plunge into controversy, I may venture to assert that all wine worthy of being so called is deserving of and requires great care. I have no wish to take an exaggerated estimate of the merits of wine ; but when insisting on the necessity for its careful treatment, I may point out that "care" taken in trifles begets care in essentials ; and it is my aspiration that, in the future, wine—natural wine, which is exhilarating rather than intoxicating—should be considered an article of necessity rather than one of luxury, a thing for daily use rather than indulgence. As an illustration of the perceptible increase in the taste for natural wines in England, I may state that, whereas prior to 1860 the importation was only 695,913 gallons, it attained in 1866 the comparatively large quantity of 3,365,802.

Improve-
ment in
national
taste.

Further
legislation
necessary.

Further legislation is also clearly necessary to develop a national taste. It was by the blundering policy and one-sided treaties of our forefathers that our bad habits of drinking strong and brandied wines were fostered, and it is to the continued exertions of the late Mr. Benjamin Oliviera, seconded by some of the more enlightened wine merchants of England, and brought to a consummation by Mr. Gladstone when he reduced the wine duties to 1s. per gallon, that we owe our partial emancipation from the thralldom of "doctored" and "loaded" wines. A revolution is taking place in the national taste, and we only await the removal of a few remaining restrictions and impediments for the change from bad to good to be perfected.

Mercantile
interest in
wine.

But it is not to laws only that we must look. It is an incontrovertible fact that the tendency of modern political economy is to bring the producer and the consumer into closer proximity. Whether this be beneficial or detrimental to their mutual interests it is not my province to determine. I simply record the fact. Looking at it merely as a fact, it surely behoves the British merchant to take care that he buys in the best markets, and thereby satisfies the consumer, with whom he has now immediately to deal. I

MR.
BECKWITH
ON
FERMENTED
DRINKS.
—

Printed and
sold by

Dr. Beckwith
on wine.

Professor
Liebig on
wine.

am no advocate for startling and subversive changes, and I recognize to the full the anxiety of our principal English merchants to secure the best and most genuine wines for their customers. As a rule, the public may have no tangible ground for complaint; but there are exceptions to the rule. The public are fickle, and the most sedulous care should be taken to meet their wants and to keep them in the right direction. There is an erroneous idea, very widely prevalent, that genuine and natural wines can only be purchased abroad, and this idea the foreigner takes good care to foster. For their own sakes, therefore, I think that the members of the English trade should put aside their false notions of "dignity," and demonstrate, by the publication of circulars, that they are alive to the change which is taking place around them, and thus vindicate our high character for energy and enterprise in commerce. It is also essential that hotel-keepers should sell their wines according to a more just and reasonable tariff than that which at present prevails. The actual scale is simply absurd; and the hotel-keeper is comparatively content with a small profit on strong and alcoholic wines, of which little can be drunk, while he levies an exorbitant tax on natural wines, of which far larger quantities would be consumed were it not for the virtual prohibition laid upon them by "fancy" names and exorbitant prices.

I should regret to conclude this report, which has already been extended beyond the limits originally assigned to it, were I not to make some allusion, however brief, to the moral and physical desirability of drinking pure and natural wine in lieu of fiery and intoxicating mixtures. It is satisfactory to know that on this head I can fortify my own opinion by the recorded language of those who, in their time, have spoken with admitted authority on the question. On the characteristics of wine compared with spirits Professor Liebig thus writes:—"Wine, as a restorative, as a means of refreshment when the powers of life are exhausted, as a means of correction and compensation where misproportion occurs in nutrition and the organism is deranged in its operation, and as a means of protection against transient organic disturbances, *wine is surpassed by no product of nature or art.*" And again, "In no part of Germany do the apothecaries' establishments bring so low a price as in the rich cities on the Rhine; for there wine is the universal medicine for the healthy as well as for the sick, and it is as milk to the aged." Of spirits Professor Liebig writes that he who drinks them "draws, so to speak, a bill on his

MR.
BECKWITH
ON
FERMENTED
DRINKS.
—

health, which must be always renewed because for want of means he cannot take it up. He consumes his capital, instead of his interest, and the result is the inevitable bankruptcy of his body."

Mr. Oliviera
on wine.

Mr. Oliviera, too, speaking in the House of Commons on the 5th of April 1853, said in reference to the wine trade:—"It is a question affecting the moral and sanitary interests of the bulk of the people of this great country; it has important bearings on the greatest of human blessings—the preservation of peace between the nations of the world; it has a most important bearing on the social and moral condition of the people, and he had observed that in countries where wine was the ordinary beverage of the people there was less intoxication and a better tone of morality among the lower classes than existed among the corresponding classes in Great Britain."

Dr. Druitt
on wine.

One more quotation, and my task may be brought to a close. It is from a little work written by Dr. Druitt, entitled "Report on Cheap Wines," and deserves, both for medical and social reasons, to be universally known. "But it is not only," remarks Dr. Druitt, "in a medical point of view, but as a friend of sobriety and morals, that I venture to advocate the larger use of wine—*i.e.*, pure wine—as a beverage. There are large numbers of townspeople, and especially of women, engaged in sedentary occupations who cannot digest the beer which is so well suited to our outdoor labouring population. The very tea which is so grateful to their languid, pasty, flabby tongues, from its astringent and sub-acid properties, and which also comforts their miserable nerves, has this intense drawback that, when taken in excessive draughts, and without a due allowance of substantial food, it begets dyspepsia, and that worst form of it which impels the sufferer to seek a refuge in the gin bottle. Cheap wine would cut off the temptation of gin, and, with an equal bulk of water, would be found, in many cases, a happy substitute for tea. I know a great deal of the better class of needlewomen and milliners' assistants, and speak from experience."

Here I pause. It only remains for me once more to express a hope that I have fulfilled your wishes; and, looking beyond the mere glitter and pageantry of this vast congress of art and industry, I augur that, so far as the "fermented drinks" are concerned, the new sources of information, and the new evidences of development shown at the Exposition Universelle of 1867, will conduce to the

improved taste, health, and well-being of the people of Great Britain.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

SUPPLEMENTARY REMARKS ON THE WINE TRADE.

Trade Marks.

Were the question asked, What is their object? the obvious reply would seem to be that trade marks are employed in order to ensure to the purchaser the genuineness of the product he is seeking, and to protect the manufacturer against the fraudulent imitator of his wares. Were these ends infallibly attained without injury to commerce, trade marks would be cordially welcomed by all. It is extremely questionable, however, whether the objects sought are really effected. In the first place, what guarantee has the consumer that the product dignified by a trade mark is of a more genuine quality than that which has none?*

Trade
marks.

Are they
beneficial or
otherwise?

We have all heard of the two mountebanks who competed in making audible the squeaking of a pig beneath their cloaks. The squeaking of one, who was an old favourite with the audience, was declared to be immeasurably superior to that of his rival, notwithstanding that the defeated candidate showed them that he had really a live pig concealed under his garment, whereas the successful squeaker was merely a skilful ventriloquist. Thus I am persuaded that most persons of business pursuits could of their own experience furnish numerous instances of inferior goods realizing considerably higher prices than others of better quality and greater intrinsic value solely because the former enjoyed the factitious decoration of a trade mark.

Let me explain that I do not object to the employment of trade marks to a reasonably limited extent, but I do not hold it to be good or sound policy to lend all the powers of stringent laws and penal inflictions to what must in the end lessen the impulse of that commercial enterprise which it is the interest of all to encourage. Merchants, no

* It is generally supposed that brandy, above all things, if bottled at Cognac, is quite above suspicion, and yet I am compelled to dispel that fond illusion, for I fear there is but little received in England which has not been, like most other beverages, "prepared," or, in other words, sweetened or doctored to suit the English "taste." Poor English taste! the term becomes, in view of our ravenous craving for potent drinks, a mere mockery of nomenclature. That I am not singular in my estimate of the "Cognac" shipped to England, I may mention that in the Paris Exhibition the French themselves declined altogether to consider some samples of what we should call very good brandy, simply because they had been "prepared" or sweetened for exportation.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

Trade
marks.

matter whether they be wholesale or retail, if they desire to obtain the patronage of the public for *unprotected* merchandise, must in the first instance show that they deserve success by thoroughly mastering the details of their business, by diligently going forth in search of the best markets, and by relaxing no possible effort to earn a character for intelligence, fair dealing, and integrity. Such exertions, however, cease to be of primary necessity when the merchant's stock is entirely of a *trade-marked* description. Such a fact destroys the very germs of enterprise, and narrows instead of enlarging the field of competition. The struggle becomes one of unscrupulous underselling instead of an earnest and just contest of emulation as to who by his own industry and capacity shall succeed in dispensing an article which is not only the cheapest but the best. The *merchant* is resolved into a *patent agent*.

Regarding the question simply as one of national commercial economy, I am convinced that did wine merchants study their business as it deserves to be studied, it would be the means of retaining in this country for remunerative investment many thousands of pounds which are now virtually lost abroad through our ignorance and indifference. Trade marks owe their most powerful support to this want of knowledge. The public have come to mistrust their own judgment, and reposing blind confidence on those who profess to take an onerous responsibility off their shoulders, they become the willing slaves of a host of extraordinary devices.

I have used the term "protected" with reference to trade marks advisedly, because I hold trade-marked goods to be to those destitute of such a distinction as protection is to free trade, and because I fancy I discern in their general adoption a reactionary tendency towards protectionist doctrines, or, in other words, towards monopoly, which must in all cases be eminently detrimental to the consumer.

The manufacturer himself must allow that the final result of protection in all trades is depression and stagnation of energy. I admit that now, as in the old days of protection, there are some noble exceptions to this rule, men whose energies are only the more quickened by the success they have achieved in business, who disdain to rely on their trade marks rather than on their own industry and ability. Still the rule exists, and is undeniably injurious to general progress, and it must ever be rules and not exceptions that most intimately concern the public. For

my own part I candidly own that I do not consider trade marks on manufactures taken as a whole to be beneficial either to the producer or the consumer.

MR
BECKWITH
ON
FERMENTED
DRINKS.

Trade
marks.

Lastly, it is expedient to inquire how intermediate commerce is affected by trade marks. If in the new era we are to recognize only two classes, those who produce and those who consume, these reflections will be useless, but as some time, I trust, is to be allowed to merchants to put their houses in order ere they definitely retire from the contest, it is as well to ask what is their present standing in the strife? What are the chief requisites in the formation of the mercantile character? Are they not a thorough and intimate knowledge of business, a high sense of honour, and an earnest desire to gain a good name? and is it not the interest of us all to encourage such a race of traders? Where, however, is the scope for mercantile action to be found, and how can a merchant exemplify the characteristics I have named if his duties are confined to selling merely that which is branded and ticketed with its price? and where is his stimulus to build up a brilliant reputation if the results of his endeavours are only to enrich some person probably personally unknown to him? It is not, I repeat, because I object on the whole to the employment of trade marks that I am so short-sighted as to ignore their usefulness to a certain extent, but I do most earnestly deprecate violent extremes of any kind, and I protest on the one hand against the prevalent plan of possessors of well-known brands attempting to push themselves over and through the ranks of those who helped them to establish their names, while on the other hand I am constrained to think that but a poor spirit is exhibited by those merchants who in their anxiety to make money care little about making reputation, and who sell certain brands or trade marks, not because in their judgment they are any better than others, but because by using them they can "steal a march," so to speak, on their fellow traders. In such conduct as much ignorance as cupidity is shown, for the instruments they employ, instead of growing up to be their pride and support, while they prove at the best but a sorry aid, are at any time liable to be snatched from them by some one more rapacious than and as ignorant as themselves.

The foregoing reflections have naturally brought me to another topic intimately connected with the general theme, and I propose to say a few words concerning—

MR.
BECKWITH
ON
FERMENTED
DRINKS.

The old and
new wine
merchant.

Effect of
Mr. Glad-
stone's revi-
sion of the
excise laws.

The differ-
ence be-
tween the
two schools.

THE OLD AND THE NEW WINE MERCHANT.

I suppose there is no branch of commerce conducted on the same principles as those which govern the wine trade, and one of the chief reasons for this is, perhaps, that wine has hitherto been regarded as a luxury rather than as a necessary of life. It is my hope and belief that a great change in public opinion is taking place in this respect, and that Reform will develop into a pacific and beneficial revolution. For this to be effected, however, it is essential that with the change in the character of the article itself, there should be a corresponding alteration in the mode of selling and in the character of the vendor, and those who are inclined to blame Mr. Gladstone for revising the excise laws, and permitting grocers and others to sell wine, should rather blame themselves for not perceiving the inevitable consequences of such a change, as had they done so they might have secured a portion of that colossal trade, now almost the monopoly of one house, which had not only the wit to see their opportunity, but also the courage and energy to seize it.

There are, fortunately, admirers of both eras or schools of wine-selling—of the new and old-fashioned trader—and it is, perhaps, for the advantage of the public that both should continue to flourish. Let us see in what they differ from one another. The old-fashioned wine merchant, as described by the more modern aspirant to fame, “is unduly greedy of profit. He does not furnish a list of prices, and so nobody knows what he has to sell, or how much he intends to charge. He is not exactly the same as other *merchants*, because he does actually sell by retail, and yet he would resent the imputation of being a tradesman, nor, as a rule, should he be so classified.”

This, or something like this, is the opinion of the new wine merchant with respect to his old-fashioned confrère. Let us hear now what the senior has to say of the juvenile with his “this” or his “that” wine at 42s., “usually sold at 60s.” To tell the truth, the old despises the new man, and thinks that he is lowering the standard of the trade, and debasing the status of the trader in every sense. He accuses the modern merchant of putting wine on the same footing as pickles, marmalade, or candles. He sneers at his continual advertisements and prices current. He declares that the quotation of prices are so multiplied that the public become weary of the very name of wine, and that

thereby the entire trade is damaged and vulgarized. And yet, when I look upon this controversy simply as one of the public, I recognize that benefit accrues to us from both schools. It is erroneous to suppose that the old wine merchant realizes any very extraordinary profits in view of the capital invested in his business, in fact I am not aware of any trade in which results so modest are realized, for instead of netting two if not three bonuses per annum, the wine merchant of old and good standing cannot reckon on securing a profit more than once in three years on an average, if indeed so frequently. No one, I think, would consider 10 per cent. too high a rate of gross profit, and even supposing that, like one of the new school (who do not keep their wines until they have reached maturity), he turned his capital over, say, three times a year, such a course would give him 90 per cent. Does any one believe he gets such a profit? It is, I repeat, to the interest of the public that both the old and new school should continue, but I do not see the probability of the former keeping its ground, if on the one hand the public persist in the foolish expectation of obtaining fine and matured wines at ridiculously low prices, and on the other the old wine merchant has the mortification to see his young competitor not merely pocketing a large income, but at the same time gaining great popularity.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

The old and
new wine
merchant.
Profits on
wine.

Turning once again to the modern school, we see a pregnant example of the evil working of trade marks or brands, and how by their means a wine merchant, even though advancing his pecuniary interests, may debase his vocation by pandering to the ignorance of the public whilst ostensibly appealing to its taste and intelligence. We will assume for example that A. is a well-known shipper of champagne; thereupon his name appears as a matter of course in the price list of a newly established wine merchant, and his products are quoted at a price considerably less than that at which they are usually sold.

Fallibility
of advertised
prices.

The merchant, however, omits to state, and the public are not aware that they ought to ask, how long this "well-known" wine has been landed in England, a most important question indeed, and one which materially affects the value of the wine. Neither does he say that the price at which he quotes this particular brand bears (most probably) a far lower rate of profit than those of other shippers, in fact that it is employed simply as a "decoy duck," whereby a too confiding and too easily "tickled" public are led to infer that all the wines sold by him are comparatively quite as cheap. But not only are the public

MR.
BECKWITH
ON
FERMENTED
DRINKS.

The future
of the wine
trade.

thus deceived, the shipper himself is also seriously injured, for in an article so dependent on what is termed "taste" as champagne, it is most important for the manufacturer to keep in the first rank as regards prices; so much so is this the case that I could name an instance in which a champagne house, being very desirous to obtain a high reputation in this country, offered to accept less than their ordinary price, provided the merchant would quote it as the very highest in his list. Like Sheridan, they were wise in their generation. They were content to take the nonsense against the sense of the country.

There can be no doubt that the wine trade is at present in a transition state. What it may ultimately become I do not profess to determine, but I feel assured that with the exception of a certain number, whose prosperity is as it were guaranteed by the exigent refinement of a wealthy and luxurious section of the community, and by whom the trade in wine will always be regarded as a matter of luxury and high art as well as a necessary of life, it would be far wiser for the traders in wine who remain to combine and become *bonâ fide merchants*, ready and willing to supply retail shops. While others who are now struggling for little more than a bare livelihood would do well to take a leaf out of the objectionable grocers' book, and if they did not sell wine with jams and pickles, try to sell it without, in an open and unmistakeable shop.

Divided into those three classes there would be little room for those objectionable addenda to the present system which, in the shape of bankrupts, swindlers, and persons unable to get a living elsewhere, have often made "going into the wine trade" a term almost equivalent to "going on the turf."

To some of the public it may appear a matter of indifference as to how manufacturers and merchants conduct their business so long as they can buy their wine cheap; to my mind, however, it is quite as important that the channel of supply should be pure as well as cheap. The last is a desirable ingredient; the first is an actual necessity. And had I to give an answer to the oft made inquiry, "Where can I get good wine?" I would say go to a wine merchant of good character.

THE DUTIES ON WINE.

Although this may not be a subject altogether of public interest, a few remarks on the fiscal aspect of the wine trade may not at the present moment be inopportune.

Duties on
wine.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

All those who are connected with the wine trade are aware that there now virtually exist only two rates of duty, viz., of 1s. per gallon on wine which contains not more than 26° of alcohol, and of 2s. 6d. on that containing from 26° to 42°.

To speak more plainly, port, sherry, and marsala pay 2s. 6d., whilst claret, burgundy, and other light wines are only charged 1s. By some this arrangement has been denounced as unfair, and these would reduce all duties to the same level. I question, however, if the demands of justice would be met by such a measure.

Putting on one side all reference to revenue, for I discard all idea that it could possibly suffer from the private distillation of even the commonest wine, it may still be asked why it is that wine is taxed in the present manner? If it be taxed simply as a luxury, the logical inference would be that all wines should bear an equal burden. Was there a different rate at first in favour of the light wines in order to encourage their consumption, I would not, if that were the case, have such favoritism continue. It amounts to protection, and never has any trade thriven so well under protection as without it, and I would fain have it thrive. But if, as it is possible, it was the intention of those who revised the customs laws to tax, not simply the wine itself but the amount of spirit contained therein, I would certainly let the differential duties remain, and I would reply to those who are agitating for a change, "We do not prefer charging a diversity of duties, we would rather for many reasons there were but one; we were informed that good, pure, natural wine should only contain a certain proportion of alcohol, and on those considerations the duties were adjusted. The remedy is in your own hands; it is you and not the laws who are the cause of differential duties."

On what
principle
were they
fixed?

It is
not
the
law
which
is
the
cause
of
the
difficulty.

"We do not say that wine properly so called shall of necessity contain a specified quantity of alcohol, we merely limit its extent, and were we not so to do, how could we in justice refuse admission to any wine, no matter what its strength, provided the growers or importers of it assured us of its genuineness. And we contend that the arrangement whereby wines of a more alcoholized nature than our standard can be entered for consumption on payment of a somewhat higher rate of duty deserves to be viewed rather as a facility than an obstacle to commerce."

Whether the alcoholic limit at present fixed is the best or whether it might not with advantage be slightly extended

Shall the
present
standard be
altered?

MR.
BECKWITH
ON
FERMENTED
DRINKS.

is, I think, a fair subject for inquiry; but I do trust the extension may be only a slight one, for I have every reason to hope that ere long all the great wine countries will find means to prepare their wines to suit our duties, whereas if we consented to alter our tariff to meet the necessity of the present and unscientific mode of preparation we must, I fear, bid farewell to all hope of improvement in taste and habits such as many of us have so long and anxiously looked for.

It has been argued in some quarters that granting the test of alcoholic strength to be a fair one in fixing the rate of duty, port, sherry, and other similar wines are, when contrasted with claret, very unfairly taxed.

But is this the case? Although the limit for the 1s. duty is 26°, the light wines rarely exceed 18°, and if that be compared with strong wine at 42°, which pays 2s. 6d., we find, first, that claret pays at the rate of 5s. per gallon for the spirit it contains, while the stronger kind only yields 6s. to the revenue; and although I am not privileged to know by what rules the framers of the Act which regulates the duties at present levied were guided, I am inclined to think that they did not disregard the calculation that the nearer wine approached in strength to pure alcohol the higher should be the RATE of duty placed upon it, more especially if that strength were in some measure due to the addition of brandy, which when it enters this country unmixed with wine, pays the highest of all spirit duties, viz., 10s. 5d. per gallon.

WINE IN ITS PHYSIOLOGICAL ASPECT.

The hygienic
properties of
wine.

Imperfect as this report may be, it would be still more incomplete did it not contain some reference (however brief) to the effects produced on the human frame by fermented beverages; but feeling that with all the interest the subject may possess I am treading, as a non-medical man, on ground which is alike difficult, delicate, and dangerous, I shall frame my remarks rather in the spirit of suggestion than in one of dogmatism, in the hope that other members of the medical profession besides Dr. Druitt may be led to the examination of this most important topic in its scientific bearings, for the sake not only of the public generally, but of medical men themselves, whose opinions, whether well or ill founded, must always have great power in influencing the national taste.

It may be asked in the first place, why we drink wine at all? and I opine I am giving a vaguely general answer

when I reply that we drink it because it is agreeable to us, and because in moderation it refreshes the body and exhilarates the spirits.

MR.
BECKWITH
ON
FERMENTED
DRINKS.

With such a general impression and with a persuasion that excess in wine, as in anything else, is detrimental to health, the majority of mankind might do well to be content, for we should be in a miserable condition indeed if we entered into minute and complicated calculations of the properties of everything we eat or drink, and of the precise proportions of influence thereby exerted on our frames ; but as among wines there are many candidates for our favour, I think it not altogether unadvisable that we should know something of their relative characteristics, to enable us, as in the case with our edibles, to select those which are best suited for our requirements.

In cases of actual illness the most trifling difference in the age and in the locality of production of wine may be of serious import, but it is not within the province of this work to enter upon these graver questions. For the general public it will suffice I think if we divide our supplies into two classes, viz., fully and partially fermented wines. By fully fermented I mean those which contain only their own natural spirit, and which have been permitted to go through all their fermentations ; while the others, although not so imperfectly fermented as some imagine, are, by the addition of brandy, prevented from undergoing a second fermentation. Let us endeavour to ascertain the differences caused by those processes.

Wine fully
and partially
fermented.

According to the doctrines laid down by some the difference is as startling as that which exists between nectar and poison, and in advocating the claims of what are termed "natural" wines can hardly find terms strong enough wherewith to denounce the beverages in which our fathers indulged. In all this there is at once injustice and impolicy. For in what does the real difference consist ? It consists in this, that there is in the first place an additional quantity of alcohol in the partially fermented wine, and further that there is retained in it a certain amount of sugar which no longer exists in the fully fermented article. At first sight this would appear to be but of very trifling moment, for apparently the addition of a little water would neutralize the difference, but I am bound to admit that it is not so easily rectified, for chemistry tells us that the presence in any quantity of saccharine and alcoholic matter are more serious than is apparent, the sugar being apt to turn acid in the system, whilst the

MR.
BECKWITH
ON
FERMENTED
DRINKS.

brandy prevents it from escaping through the skin and other parts of the human economy as easily as it otherwise might do. The result is a tendency on the part of the captive matter to solidify in the blood, and so produce gout and other kindred ailments.

If this hypothesis be correct I cannot too earnestly wish "God speed" to those who are striving against prejudice and deep-rooted habits, and are unceasing in their endeavours to supply us with pure and fully fermented wines. There can be no doubt, I take it, that wine acts more as a stimulus to nutrition than as a material of nutrition, and since the usages of society and our own inclination induce a larger individual consumption than is perhaps necessary, it becomes a matter of imperative importance that what we drink, if it does not contain much that is actually beneficial, should at any rate be as free as possible from that which is actually noxious.

My own opinion has always been that for general use in this cold and humid country a powerful and generous wine is necessary, provided that its strength be natural and that it has been properly fermented. We require a wine which when taken alone will act as a cordial and a restorative, and which, when mixed with water, will form a pleasing and refreshing beverage; and I have sufficient faith in the energy and intelligence of my countrymen abroad to believe that these desiderata will ere long be obtained.

CONCLUSION.

Conclusion.

Let me, in conclusion, apologise to the reader if in any of the arguments or considerations I have adduced I may have been thought to have assumed anything approaching a dictatorial or authoritative tone. I have sedulously endeavoured to avoid the assumption of the office of a preacher or a moralist, for it is as far from my ability as it is foreign to my intention to arrogate to myself either the first or the last named functions.

It has been said that the easiest way to an Englishman's heart is through his stomach. Without endorsing or repudiating this doctrine, I do very seriously think that the moral status of a nation is materially influenced by its physical amusements and indulgences, and that these are generally found to be in accordance with its tastes and its standard of mental development. Actuated by this belief, I have very timorously ventured from time to time to interpolate amidst technical information a few hints as

to how possibly the taste of the people of England might not altogether be bereft of benefit by a more careful attention to our beverages, and by conscientious attempts to give the public something better to drink than that to which they have been hitherto accustomed. Any more decisive expression of opinion on my part would have been alike useless and impertinent.

MR.
BECKWITH
ON
FERMENTED
DRINKS.
—

In the firm hope that I shall live to see the day when it shall be practicable among all classes of my countrymen to obtain a glass of pure and sound wine,—whether it be used as a gentle stimulus to health, as a promoter of innocent cheerfulness on the very few occasions when in this busy country we can enjoy relaxation, or, lastly, as a restorative and an anodyne in sickness, and a comfort and support in old age,—I lay down my pen and bid the reader farewell.

THE
HISTORY
OF
THE
UNITED
STATES

to how possibly the cause of the people of England might
not altogether be lost of benefit by a more careful
attention to our bearings, and by conscientious attempts
to give the public something better to drink than that
to which they have been hitherto accustomed. Any more
extensive expression of opinion on my part would have
been alike useless and impertinent.

In the first place, I shall live to see the day when
it shall be necessary to study all classes of my countrymen
to obtain a glass of pure and sound wine - whether it be
best as a gentle stimulant to health, as a tonic for
the system, or as the very few occasions when in
this poor country we can enjoy relaxation or health, as a
necessity and an antidote to sickness, and a comfort
and support in old age. - I lay down my pen and bid
the reader farewell.

THE
HISTORY
OF
THE
UNITED
STATES

THE
HISTORY
OF
THE
UNITED
STATES

REPORT on LIVE STOCK in the PARK of the EXHIBITION (Classes 75, 76, 77, 78, 79, 80).—By Captain COCKERELL.

CAPTAIN
COCKERELL
ON LIVE
STOCK, &c.

THE prizes in Classes 75, 76, 77, 78, 79, and 80 are, according to the programme of the Exposition, to be competed for, not in the building or park on the Champs de Mars, but in a special yard constructed for this purpose at Billancourt, a short distance further down the Seine. Exhibition at Billancourt.

It is intended, therefore, that a series of shows (*concours*) should there be held in the following order:— Shows.

April	{	1st	fortnight,	Sheep.
		2nd	do.	Fat cattle.
May	{	1st	do.	Cows.
		2nd	do.	Sheep (bred on account of their fleeces).
June	{	1st	do.	Horses for draught.
		2nd	do.	Farmyard animals.
July	{	1st	do.	Bulls and cows (for draught).
		2nd	do.	Horses (for riding and driving).
August	{	1st	do.	Dogs.
		2nd	do.	Oxen (for draught).
Sept	{	1st	do.	Pigs.
		2nd	do.	Asses and mules.
Oct.	{	1st	do.	Fat cattle.
		2nd	do.	Acclimatised animals.

In spite, however, of these arrangements, a few animals belonging to the above classes have found their way into the park of the permanent Exhibition, and they, or somewhat similar specimens, are in most cases to remain there during the time the Exhibition is open.

At the entrance of the park leading to the *École Militaire*, and close to the gate, is the model farm of the Agricultural Society of Seine et Marne, and here is exhibited a constant succession of cows, oxen, and sheep, and generally some object worthy of attention will be found there. Adjoining this building is another small model farm, the principal feature of which is a circular cowshed, exhibited by M. Giot, the great agriculturist of the same department. Model farm.

As, however, the animals in these farms are changed constantly, no particulars relating to them can be given that would be useful.

CAPTAIN
COCKERELL
ON LIVE
STOCK, &C.

Poulalier
roulant.

Chicken-
house.

The Poulalier roulant here exhibited appears to be an admirable contrivance, and renders easy the shifting of its inhabitants from one ground to another—a process known to be highly beneficial to poultry, although usually neglected, from the difficulty that exists in effecting it.

Leaving the main avenue, a little behind M. Giot's farm, we find an ornamental chicken-house, and other farm buildings of the same character, designed with much taste by the Marquis d'Havrencourt, Chamberlain to his Majesty the Emperor.

Here, again arises the difficulty of affording a detailed account of their contents, owing to the constant changes that take place; but, as the duty of providing the inmates of these pretty little buildings rests with M. Bocquet, something of interest is invariably to be found in the careful selection made.

Roquefort
cheese.

A little further on, in an easterly direction, is a strange rock-like building, exhibited by the cheese manufacturers of Roquefort. Outside will be seen feeding two or three ewes of the peculiar Larzac breed. Bad as food, they are highly valued for their milk, from which the celebrated cheese is made, well known to almost every visitor to Paris. Large flocks of these sheep are bred and fed on the arid plains around Roquefort. So scanty, however, is the herbage there, consisting chiefly of aromatic plants, which, however, contribute greatly to the peculiar flavour of the cheese, that much artificial food is found necessary, and fields of Luzerne grass are commonly grown for this purpose. The cheeses are made in the districts surrounding the village, but are all brought into Roquefort to be stored in the caves there; and it is from this process that they are supposed to derive their great excellence.

Two reasons are assigned for the impossibility that exists of producing as good an article anywhere else. Its excellence is supposed, first, to be derived from some peculiar quality in the stone of which the rocks forming the caves are composed, but more especially is it attributable to the ventilation caused by the natural fissures in the rocks themselves, whereby a soft current of cool air is constantly kept playing round the galleries in which the cheeses are placed.

The "mould," however, is partly artificial, and is obtained by introducing into the cheese a liquid of decayed bread. This bread, again, is purposely made with large quantities of yeast, and quickly gets into the mouldy state required to make the solution.

The building in the park represents one of these rock caves, the cheeses being arranged and the little lamps from

burning, as in the wilds of Larzac. As regards the sheep which the milk is taken, and of which, as we have said, specimens are kept on the spot, we may mention that some experiments were tried about fifty years ago to improve the value of the wool of the sheep by the introduction of some of the Spanish merino blood. The result was not satisfactory, and the milk-giving properties of the ewes were considered thereby to have been greatly impaired; and much pains have since been taken to recover the original purity of the breed. The Larzac sheep is thus described by M. Jules Bonhomme:—

“ We find in the Larzac sheep the same features that are traceable in several breeds of cows renowned for their milk-giving qualities—viz., a narrow chest without depth, a broad flank, a big stomach, and spare shoulders and thighs, at the same time a much-developed udder and a fine smooth skin. Like causes produce like effects in each race. The lamb, like the calf in milk-yielding races, is weaned too soon, and is badly nourished from its tenderest age; and to this cause is ascribed their defective build. The milch sheep, like the milch cow, is over fed; her paunch and stomach become large and, as she must give almost as much in milk as she consumes in food, there remains an insufficient quantity of nourishment for the proper development of the other parts of the body. The height, size, and yield of the Larzac sheep varies according to the fertility of the pasture on which she is fed. From this cause has arisen the mistaken idea that two different breeds existed there. The lambs that are taken when young to the most fertile plains naturally obtain a greater development than those reared on the poorer pasturage.”

Larzac
sheep.

An average sheep yields about fourteen kilogrammes of cheese, though some have been known to give as much as 33 kilogrammes. It is calculated that the flocks number 400,000 sheep, of which 250,000 are ewes giving milk, and that in 1866 3,250,000 kilogrammes of cheese were sold to the trade.

Leaving the Larzac sheep, and still pursuing an easterly direction, we come to M. Bignon's shed, where stand specimens of the animals bred and fatted by this gentleman. As, however, these, again, are being constantly changed, no remarks on the animals individually can be given. M. Bignon's mode of fattening cattle by keeping them quiet and warm should be observed. The ox in the further compartment, with only a small hole from which to view the public, is undergoing the process; and he will probably be served up by his present owner at his admirable establishment on the boulevards to some of his visitors this summer. The

M. Bignon's
exhibits.

CAPTAIN
COCKERELL
ON LIVE
STOCK, &c.

whole of M. Bignon's agricultural museum is interesting; and if, indeed, his farming is as good as his cooking, he deserves, and doubtless obtains, the success in the former which he has long achieved in the culinary art.

Merino
sheep.

Passing by the "Tarentaise" cows, which, except in colour, resemble and are descended from the Swiss races, we come to M. Gilbert's exhibit of merino sheep. It is well known that this sheep was until lately worthless as mutton. M. Gilbert, however, determined to breed a merino sheep that should not have this disqualification. Various experiments had at different times been tried with this view; but the crossing with other breeds had always led to the same result—as the meat increased in weight and goodness, the fleece in like manner decreased in value. The plan he adopted was, we are informed, entirely one of careful selection. Taking invariably the fattest and best sheep combined with the best fleeces, M. Gilbert has succeeded in obtaining an animal yielding a fine fleece, and also making mutton of good quality. The success, however, which has at last crowned M. Gilbert's efforts was not achieved in a day, and it was only after years of untiring patience and determination that he obtained the present happy result.

Model dairy.

In the Boulevard du Sud is a pretty little model dairy, erected by the Comte de Kergorlay, in which some fine cows are generally to be seen. These are continually changed to admit of the various species being exhibited.

Siberian
greyhounds.

Turning the corner of the Champs de Mars, and adjoining the Russian stable, we find a kennel with two Siberian greyhounds. They have somewhat the appearance of lurchers, and are used, we are informed, for running down large game, after it has been driven from cover by packs of smaller dogs.

Egyptian
ass.

In the south-west division of the park, in a building between the Temple of Edfou and the Viceroy's palace, are stabled two excellent specimens of the Egyptian ass, whose gentleness and swiftness are proverbial. Unlike their European brethren, who are regarded as fit only for the costermonger's cart, these animals, when well bred and well trained, are much prized. Considerable attention is bestowed on their breeding, and they are subsequently trained "to run," for their pace can be defined by no other term. This peculiar step is taught by tying the fore and hind legs together, and forcing the animal along at a trot, at the same time that the head is tightly reined in. Some asses acquire this run with great ease, and one that is well broken to it, and can accomplish six or seven miles an hour, will fetch, if also strong and handsome, a very considerable

price. It will be observed that the skins of these animals are shining and well kept, and they themselves are fat and well fed, evincing the care and attention bestowed upon them by their sable attendants. In fact, the ass in Egypt takes the place of the horse in Europe; and the two specimens here exhibited are good types of their race. The white ass, we are informed, was born in Aboushir, in Lower Egypt, and is three years old; the black one is from Minieh, in Central Egypt, and is four years old.

We have now noticed most of the living animals exhibited in the Champs de Mars, coming strictly under the head of group 8. There remain, however, a few to which attention should be paid, although coming under no special group or class in the Exhibition catalogue.

Under the same roof with the asses just noticed will be found two camels from Egypt. It must be distinctly understood that these are not specimens of the ordinary baggage camel, but of the Arabian riding camel, celebrated for its fleetness and endurance. In short, these animals bear precisely the same relation to the baggage camel that the thorough-bred racer does to the dray horse. We have used the word *camel*, as being the one generally employed and understood; properly speaking, however, the double-humped, or Bactrian camel (*Camelus bactrianus*) is unknown in Egypt, existing only, indeed, in Central Asia, the single-humped dromedary (*C. dromedarius*) being the only one there used, whether for riding or baggage.

Arabian
drome-
daries.

A good riding dromedary will perform a journey of 120 miles in the course of 24 hours, without taking either food or water, supplies of which it carries in itself; the hump being composed of a fatty substance from which the animal is able to derive sufficient nourishment for seven or eight days, while a cavity in its stomach is capable of containing a supply of water unchanged during a like period, from which it is also able to draw at pleasure. The consequence, however, of one of these rapid journeys often proves fatal. For a short distance, of course, a much greater rate of speed can be obtained. Both the dromedaries exhibited are females; one is of the race of Bicharis, and was born at Abou-Hamed, in the Soudan, and is 10 years old. The other is of the race of Haïdi, was born at Abourich, in Lower Egypt, and is nine years old. A camel arrives at maturity in about five years, the duration of its life being about 40 years. These two specimens are well worthy of admiration; for, though the coarser sorts of the race are occasionally seen in this part of Europe, the aristocracy of the genus, as here exhibited, seldom find their way so far from home. The small,

CAPTAIN
COCKERELL
ON LIVE
STOCK, &c.

well-shaped head, the full, lustrous eye, and the more delicately formed limbs are the distinguishing marks of the high-born dromedary. Their accoutrements, saddles, and attendants are also interesting and picturesque.

A large shed is in the course of construction near the Chinese pagoda for the purpose of receiving two Siamese elephants, which, however, have not as yet arrived.

Under the same roof with the asses just noticed will be found two camels from Egypt. It must be distinctly understood that these are not specimens of the ordinary baggage camel, but of the Arabian riding camel, celebrated for its fleetness and endurance. In short, these animals bear precisely the same relation to the baggage camel that the thoroughbred race horse to the grey horse. We have used the word camel, as being the one generally employed and understood; properly speaking, however, the double-humped or Bactrian camel (*Camelus bactrianus*) is unknown in Egypt, entering only, indeed, in Central Asia, the single-humped dromedary (*O. dromedarius*) being the only one there used, whether for riding or baggage.

A good riding dromedary will perform a journey of 120 miles in the course of 24 hours, without taking either food or water, supplies of which it carries in itself; the food being composed of a fatty substance from which the animal is able to derive sufficient nourishment for seven or eight days, while a cavity in its stomach is capable of containing a supply of water unchanged during a like period, from which it is also able to draw at pleasure. The consequence, however, of one of these rapid journeys often proves fatal. For a short distance of course, a much greater rate of speed can be obtained. Both the dromedaries exhibited are females; one is of the race of Bichan, and was born at Abou-Hamed, in the Soudan, and is 15 years old. The other is of the race of Haidi, was born at Abou-Hamed, in Lower Egypt, and is nine years old. A camel arrives at maturity in about five years, the duration of its life being about 40 years. These two specimens are well worth a visitation; for, though the coarser sorts of the race are occasionally seen in this part of Europe, the aristocracy of the genus, as here exhibited, seldom find their way so far from home. The small

HORSES, ASSES, and MULES.

SECOND REPORT on Class 75.—By Captain COCKERELL.

CAPTAIN
COCKERELL
ON LIVE
STOCK, &c.

To complete the vast plan of the Universal International Exhibition of 1867 it was determined to hold a series of agricultural shows at the island of Billancourt, some way down the Seine, in a special yard constructed for the purpose. Billancourt.

Horses, cattle, sheep, and dogs were to succeed one another every fortnight. The horse shows, two in number, were to take place, one in the first fortnight of June, the other during the second fortnight in July. A show of asses and mules was also appointed for the second fortnight in September. Horseshows.

It may as well be at once stated that in an international point of view these shows were failures. How, indeed, could it be otherwise? The inducements held out to foreign exhibitions could hardly have been considered by the most sanguine as sufficient to attract a large or brilliant attendance. Exhibition not successful.

No money prizes of any sort were offered, and the honour of a trifling medal was certainly not enough to induce the owners of valuable cattle in distant countries to encounter the risk and expense of a long journey.

Even the prospect of an extension of reputation, which might have induced some of the larger dealers to come forward, and which contributes so materially to the success of international exhibitions, was not offered in this case. The distance of the show-yard at Billancourt rendered the number of daily visitors there comparatively small; and a dealer, wishing to show his horses to the public, could not but feel that he had a better chance of doing so in a livery-stable in the Champs Elysées than in a remote island some miles down the Seine, at all times difficult of access and in bad weather almost unattainable.

In the first exhibition Mr. Howard showed a few English horses; and in the second, half a dozen horses from Trakehnen (Prussia), and a similar number from Deux Ponts, in Bavaria, composed the whole of the foreign element. Mr. Howard.

As a show of French horses, the exhibition may be said to have been more successful, though here, again, certain causes militated against complete success, especially in the first *concours*. French Horses, 1st show.

CAPTAIN
COCKERELL
ON LIVE
STOCK, &c.

This was composed of horses especially adapted for draught, with breeding mares and stallions of the same classes. Now, this show, occurring before the close of the spring and at a time when the stallions cannot be spared from the country, rendered a large attendance of them impossible without serious loss to the owner. To this it must be added that a "Concours Hippique" took place about the same time on the Esplanade of the Invalides; and a *concours* at Caen, which must have taken away some of the Norman horses, occurred at the same time. The show of horses, therefore, was hardly as large as might have been expected; and the principal interest was centred in the horses of the four great French breeds, viz., the Percheron, Normand, Boulonnais, and Breton. Of these, unquestionably for this class of horse, the Percheron takes the first place in the general opinion of France. Out of the eight first prizes awarded by the jury, seven were decreed to this race, the remaining one being given to Mr. J. Howard's English cart-horses.

The largest purchasers of these horses appear to be the omnibus companies of Paris, and almost all their carriages are horsed from "Le Perche." There is no doubt that this race is a most useful one, and well adapted to the service for which they are now employed. A strong, compact, sturdy build, admirable feet,* and well-bred, handsome heads, are the characteristics of the race. An extraordinary resemblance exists in the general outline of all this family, pretty nearly every horse having the same merits and defects. The faults appear to be a want of power, particularly behind, the horses being generally under-limbed, causing them to trust to their weight rather than their strength in the performance of their work.

The introduction of English blood has been largely resorted to to mitigate the defects, and in the horses brought before the jury almost all bore marks of this intermixture. Great divisions of opinion have arisen relative to the advisability of these crossings, one party declaring that the Percheronne race is perfect as it is, the other advocating a still further introduction of foreign blood.

The tendency of all foreign races to assimilate themselves to those of the country to which they are brought, would tempt one to believe that a judicious system of selection would now do more to improve the excellent, though far

* One of the principal objections made to Mr. Howard's horses was the state of their feet, arising from bad shoeing. In this respect the French appear to me to be far in advance of us.

from perfect, breed of horses of the Perche than the perpetual introduction of fresh blood.

CAPTAIN
COCKERELL
ON LIVE
STOCK, &c.

It is to be regretted that the Normandy and other races of French horses, were not better represented. The few inferior specimens of each race that were exhibited being thrown far into the back-ground by the array of Percherons.

A stallion of this race, seven years old, exhibited by the Baron de Fourment, called forth the special admiration of the jury. The remainder of the first prizes were awarded to MM. Moreau, Pierre Perpère, Guillemin, Georges Moreau-Chaslon, and Lacour, and to Mr. J. Howard, of Bedford, for his English cart-horses, whose merits are hardly yet sufficiently understood in France.

The second exhibition took place during the second ^{2d} fortnight in July, and, although equally a failure in an international point of view, was larger, as regards horses, than the first.

The announcement called for "*Chevaux de Luxe*," *i.e.*, riding and driving horses, ponies, hunters, &c.

The principal part of the show consisted of animals exhibited by the dealers who supply the Paris market, and a very good idea from it can be formed of the style of horse now in demand amongst the upper classes in France. There was a total absence of anything of the nature of hunters, the whole being either light hacks or carriage horses. Of these again, the latter formed the largest and most interesting part of the exhibition. These horses are principally bred in Normandy, and are known as the Anglo-Norman breed. They fetch large prices; indeed, quite as much as similar cattle would in London. The first prizes, carried off by Messrs. Marion and Delaville, for their respective collections of animals, were indeed well earned, and it is rare to see a more satisfactory string of young horses than those exhibited by each of these gentlemen.

As previously mentioned, the foreign element of the second show consisted of six horses from Trakehnen, in Prussia, and a few from Deux Ponts, in Bavaria. The two Hanoverian horses and ten Dutch mares belonging to French dealers could hardly be called a foreign element. In favour of the Trakehnen breed, little can be said. Originally a royal stud, founded in 1730, its energies have been devoted to breeding a set of perfectly black horses, whose fine colour seems now to constitute their chief merit. In spite, however, of their weedy appearance, they have a certain air of breeding and distinction about them, marking a long and noble lineage; and the extraordinary likeness of all these

Prussian and
other foreign
horses.

CAPTAIN
COCKERELL
ON LIVE
STOCK, &c.

Russian
horses.

horses to one another evidences the care that has been taken to preserve their breed untainted from without.

Of the Deux-Ponts horses, still less can be said. Descended from pure Arab stock, of which they still bear the strongest marks, they have degenerated into the lightest ponies, fit only to carry ladies and children.

Though badly represented at the Billancourt shows, several foreign horse found their way into the park of the Champs de Mars. The foremost in appearance of these collections were those exhibited by the Russian Commission. A neatly built wooden stable, curiously carved and unpainted, standing just outside the Russian department of the great building, contained the 24 horses sent over to illustrate the races of the immense empire of the Czar. An interesting little pamphlet published by the Commission, after tracing the organization of the studs of the empire, divides these horses into four classes—saddle-horses, trotters, horses for draught, and types of the different races. The foundation of studs in Russia is supposed to date from the earliest part of the sixteenth century, previous to which, however, a considerable portion of the revenue of the Crown was derived from the sale of horses. The father of Peter the Great appears to have been the first Czar who seriously endeavoured to improve the breeds of the country. Notwithstanding this, the Empress Anne, in 1730–40, was forced to buy horses for her body-guard in Germany. From that time, however, steady progress has been made until the studs of Russia have reached their present development: the total number of horses now in the empire amounting, we are told, to no less a number than 20,370,000.

Taking the saddle-horses in the first place, we find they are bred almost entirely from English and Arab blood crossed, and are apparently with justice held in high estimation. “Iskander Pacha,” one of the handsomest of them, with a large proportion of Arab blood in his veins, is valued at 2,000 roubles (about 220*l*.)

The introduction and cultivation of a special race of trotting-horses in Russia is due to the celebrated Count Orloff, and their improvement has been a subject of much interest. Most of the horses exhibited belong to private individuals, and two of them were winners of several trotting-matches.

Some fine powerful draught-horses were exhibited in the third class, though here there would appear to be still much room for improvement.

The fourth and last class of the Russian stable was, perhaps, to the stranger the most interesting of the whole. The

higher breeds of horses in most countries spring from nearly the same roots, and Arabia first and England subsequently have furnished the original stock of most, if not of all, the thoroughbred horses in Europe. But to see specimens of the original breeds from all parts of the immense Russian empire was a curious and most remarkable sight. The world-wide reputation of the Cossack cavalry must make interesting even to the most superficial observer, these representatives of the hardy little animals which have enabled their riders to perform the services for which they have acquired such undying reputation.

The horses of the Cossacks of the Don were here represented by "Donetz," a neat, wiry, little animal, well adapted for the services of irregular cavalry. Animals of this breed fetch, we are told, from 12*l.* to 24*l.*, at the fairs held in the centre and south of Russia. It would occupy too much space to take each horse separately, but I give a list of them, and the governments in which they are bred, and their usual prices.

"Vasska," Bitiougue race, from the government of Voronège and Tambov; prices, from 24*l.* to 48*l.*

"Fine," Finland race; price, from 24*l.* to 48*l.*

"Vapsikass," Livonian race. These horses are said to spring from Arab blood, imported to the island of Oesel by the Crusaders, prices, from 9*l.* to 22*l.*

"Jmoud," from the government of Kovno, well adapted for agricultural purposes; prices, from 9*l.* to 20*l.*

"Konfetka," from the government of Perm; from 9*l.* to 30*l.*

"Bachkir," from the Ural Mountains; prices, from 7*l.* to 16*l.*

"Khan," of the Transcaucasian race; from 22*l.* to 48*l.*

"Kabardinetz," from the Caucasus. This horse is also interesting as being one of the riding horses of his Majesty the Emperor.

One concluding remark I must make on the extraordinary resemblance of these horses to those on which the irregular cavalry of British India are mounted. Many of them bear strong marks of having sprung from the coarser breeds of Bokhara and Persia, from which most of the horses now used for cavalry purposes in India have derived their origin. Considerable interest was added to the Russian stable by the picturesque dresses of the attendants, and the accoutrements and saddlery which hung about its walls.

In the month of July the Austrian Government exhibited a small collection of horses from their studs. Six of these representing the different races principally bred at the great

Austrian
horses.

CAPTAIN
COCKERELL
ON LIVE
STOCK, &c.

establishment at Mezœhegyes, Kisber and Babolna, in Hungary, and at Radantz and Piber were here shown. Of these studs the first is far the largest, containing no less than 800 brood mares. Much value is set upon the descendants of a famous stallion named "Nonius." Of Anglo-Norman blood, and born in Normandy, he was early transferred to the stud at Deux Ponts, then part of France. In 1815, during the war, "Nonius" fell into the hands of the Austrians, and was sent to Mezœhegyes, where he became the progenitor of a race of horses named after him. After fifty years his descendants continued to reproduce his likeness with extraordinary fidelity, and upwards of 200 brood mares of his blood are at present at Mezœhegyes.

Tunis.

A few horses from Tunis were exhibited in a stable of their own in the park. They were coarse Arabs of no peculiar merit, and interesting only as showing the style of horses raised in the north of Africa.

The third and last show at which the attendance of the jury of class 75 was required took place in the second fortnight in September. The exhibition consisted of asses, mules, and the horses of the race from which mules are bred. The show, though not large, was of considerable interest, embracing, as it did, all the branches of this large and valuable industry. The interest was greatly increased by the attendance of certain experts,* who afforded the jury much information respecting a trade so entirely local as to be almost unknown out of the district in which it is carried on.

The animals exhibited may be divided into three classes—firstly, the horses from which the mule-producing mares are bred; secondly, the asses, sires of the mules; thirdly, the mules themselves.

Of the first, we need only say that the stallions were fine, strong, coarse-bred animals, somewhat resembling an undersized English cart horse. The mares were large, roomy, and strong.

Poitou ass.

The Poitou ass, as exhibited at Billancourt, the sire of the beautiful mules so largely imported into Spain, is an animal of peculiar and hideous appearance. His body is short, his legs long, his back straight, his quarter long, thin, and flat, and his shoulder very straight. An enormous head and long ears, often pendent, are the features that strike one at first sight. The immense size of his joints, however, soon inform one of the power and strength with which he is

* Principally M. Ayrault, to whose interesting remarks and admirable book, published since the Exhibition, I am indebted for most of my information.

gifted. The whole is shrouded with a cloak of long dark hair, over which neither comb nor brush is ever allowed to pass. The consequence is that the hair of several years becomes matted together, and hangs in brown felt-like rags all over the animal, giving him a filthy and uncouth appearance. The reason of this prejudice (the keeping the animals in a perpetual state of dirt), and of some other of the peculiar points insisted on for mule-breeding asses, does not quite appear. For instance, an ass should have the largest head and longest ears possible. Again, the ears should be lined with long curling hair; the back of the fetlock should also be garnished with long hair, and, above all, the coat should be long, curly, and woolly.

The value of male asses is very remarkable, ranging from 120*l.* to 320*l.*, 200*l.* to 250*l.* being the ordinary prices they fetch. The principal reason for this is said to be the difficulty there is in rearing them during the first month of their existence, the greater part of them dying from an internal inflammation during the first few days after their birth. Once past the first month, they are easily reared and retain their full health and powers to a great age, twenty-five to thirty years being nothing uncommon. The she ass is comparatively of little value, and for 24*l.* you can have your choice. They are, however, seldom parted with by their owners when known to be good mothers.

The purchase and sale of male asses forms, as may be supposed, from their price, a very important event amongst the farmers of Poitou. The arrangement of a bargain frequently occupies twenty-four hours. After viewing the animal, the parties concerned proceed to eat and drink together; after which another inspection takes place, and again they retire to eat and drink. This is continued till a satisfactory deal is concluded, when the new purchase, ornamented with ribbons and crowned with laurels, is triumphantly conveyed in a cart covered with an awning to his new home, and which, once reached, the ass never again leaves. Placed alone in a loose box, he there remains for life. The stallion asses alone live at the studs; the mares, being the property of the farmers of the neighbourhood, are brought there when necessary, the ass, as before said, never leaving his stable even for a few minutes' exercise.

The number of studs in Poitou is estimated at about 160. Each stud contains on an average five stallion asses. Considering the number of people employed in this trade, one would be tempted to believe that the owner of a breeding stud would find in it a good return for the outlay of his capital. Strange to say, this is not the case; and M. Ayrault,

CAPTAIN
COCKERELL
ON LIVE
STOCK, &c.

in a calculation which he gives, comes to the conclusion that, on an outlay of 450*l.*, a clear profit of 4*l.* 8*s.* is all that can be expected.

The studs appear to be hereditary, and it is more as a point of honour than as a matter of profit, that they remain in the hands of their present owners.

Mules.

The mules exhibited at Billancourt were of two descriptions—the first, large, tall, and strong, fitted for baggage and agricultural purposes; and the second, of lighter build and more aristocratic appearance, and bred especially for Spanish market.

It should be distinctly understood that the mule of commerce is invariably the produce of the male ass with the mare; the produce of the horse with the she ass is of little value. The reason of this is easily understood, the large, roomy body of the mother allowing an early development in the former case, which would, of course, be impossible in the latter.

The internal trade in mules commences in Poitou when the animal is seven or eight months old; the breeder then sells him to the farmer, who, after allowing him to run wild till nearly two years old, commences to work him. After working in the farm for two years, the mule is fattened and brought to the fair, where he is sold to one of the foreign dealers, and leaves home for the south of France, Italy, Spain, or America.

Most of the mules exhibited at Billancourt were fit for exportation, and were considered favourable specimens of their race; in proof of which I would mention that a bay mule four years old, belonging to M. Raimbault, of Deux-Sèvres, which carried off the first prize, was sold for 1,300*f.* (52*l.*)

Prices.

The price of mules varies from 300*f.* to 1,500*f.*; the average price being about 600*f.* (24*l.*) In the Mauritius and other colonies the French mule fetches nearly double the prices of those bred at the Cape; a she mule is always more valuable than the male.

About 18,000 mules are sold in Poitou every year, bringing 10,800,000*f.* into the pockets of the farmers of the country. It is calculated that the brood mares have nearly doubled in number since 1815, so prosperous and lucrative is this branch of the trade found. It is also said that in the event of a war 18,000 baggage mules could be obtained by the Government in the course of a fortnight from Poitou alone.

REPORT on a NEW SYSTEM of SHOEING HORSES.—
(Class 75.)—By CAPTAIN COCKERELL.

CAPTAIN
COCKERELL
ON
SHOEING
HORSES.

THE cases of horses' shoes shown at the International Exhibition were not very numerous. One in the Prussian section, two in the English, and one in the French constituted the entire exhibit. Nor, with the exception of the last, did these cases contain anything very new or interesting. I will, therefore, at once pass to the examination of M. Charlier's system, as being the only one displaying any striking novelty, and the only one that was brought prominently before the jury of class 75.

Horses'
shoes.

M. Charlier's
system.

Before entering into a description of this method of shoeing, it is necessary to understand the grounds upon which M. Charlier bases his theory. They are as follow:—

A horse in its natural state is unshod. Placed by man to perform unnatural work upon artificial roads, it becomes necessary, in order to prevent the hoof from being injured, to protect his feet with shoes. The object, however, of all shoeing is to interfere as little as possible with the action of the horse. How, then, has the old system succeeded in this respect? M. Charlier at once answers that it has not succeeded at all; one third of the horses one meets are lame, and three quarters of these are lame with diseases of the feet arising from bad shoeing. What, then, is the old system? "It is a plate of metal, always too large, placed below the horse's foot—a sort of hard sole, inflexible, heavy, and polished by use—resting at the same time on the crust or wall of the foot and on the sole, which is pared down so as never to touch the ground or receive any of the horse's weight upon it." This, M. Charlier says, must be all wrong.

Old system
of shoeing.

1st. Why should the sole of the foot and frog not come upon the ground? Nature seems to have meant it to do so, and for this purpose has armed the former with strong and constantly-renewed horn, which modern farriers carefully remove.

Objections.

2nd. Does this heavy, hard iron shoe really protect the foot against the shock that takes place every time the latter comes to the ground? On the contrary, the hard metal plate, coming in contact with the hard road, sends into the foot a concussion, which, incessantly repeated, produces the most disastrous consequences.

CAPTAIN
COCKERELL
ON
SHOEING
HORSES.

NO
SHOEING
HORSES.

Details of
"Charlier"
system.

notave by
"Charlier"

Objections.

3rd. Is it right to make a horse carry a dead weight of iron on his foot double what is necessary? Must this not cause great and unnecessary expenditure of strength, and produce an immense amount of fatigue; in short, causing a great waste of power.

4th. The want of elasticity of the present shoe must be bad. It compresses the foot, impedes the circulation, and, by this, prevents the hoof from receiving its proper amount of nourishment, thereby drying it up and producing numberless diseases, by bringing it into an unhealthy state.

Moved by these and similar arguments, M. Charlier resolved in his own mind that the old method of shoeing was faulty in the extreme, and he determined to study how best these defects might be remedied.

The following is the plan that he at last decided upon, with what success I shall hereafter show:—Taking an instrument something like a square gouge, with a guide to prevent its cutting beyond the required depth, the farrier scoops a rectangular groove from the outer circle of the horse's foot. Into this groove is fitted an iron band, measuring rather more than the thickness of an ordinary horseshoe, with only half its width; this is secured with from five to seven nails. The shoe being thus sunk, the sole of the foot, which is never pared, and the frog are brought on the ground. The shock of the constant concussion of the iron shoe on the hard road is thrown into the wall of the foot, and not into the softer parts of the foot, which are protected by the tough and elastic horn of the sole; the frog being also brought on the ground allows the animal to feel and, as it were, to grasp the earth in slippery places. The shoe, being narrow, has a certain amount of elasticity about it, and, after a few days' use, adapts itself to the natural shape of the foot, expanding with its movement and developing the frog, bringing the whole foot into action; so much is this the case that, after three or four months, the foot is frequently found to have entirely altered its shape.

And here I should allude to another improvement of M. Charlier's. The holes into which the nails are driven are made oval instead of square, consequently the rectangular nail driven into them takes their shape, and by this means acquire a firmness of hold which is very advantageous. As was natural on the first introduction of a new idea, M. Charlier met with the most vigorous opposition, and some of the more prominent arguments used against him were as follow:—

Having first been told that there was nothing new in his plan, that it had been tried and had failed years ago, other

objections were brought forward. It was urged that, having removed the iron from the sole of the foot, the latter remained wholly unprotected from sharp stones and rough ground. This M. Charlier refutes. The horn having been allowed to grow, becomes hard and thick, and well able to resist a sharp stone or any such substance; added to which, the shoe being imbedded in the hoof, no small stones or dirt can lodge between the foot and the shoe. Again, it is said, that the groove cut for the insertion of the iron must be so deep as to injure the sensitive parts of the foot. This is denied. At first a light shoe is used, and the groove is not deep. Eventually, as the foot strengthens and grows, a deeper iron can be used if necessary; but besides this, no sensitiveness exists in this part of the foot, and consequently there is no such danger to be apprehended if decent care is taken at first. And here I may state that M. Charlier's latest experiments lead him to think that when a horse is first shod the shoe should descend a trifle (about the eighth of an inch) below the foot to allow for wear. It is hardly necessary to observe that the shoes should vary in thickness and weight, according to the size of the foot to which they are to be applied.

Another objection advanced is the difficulty, in the event of a horse losing a shoe at a distance from home, of having it replaced. Of course, on the general introduction of this system, this objection would disappear naturally. Meantime, we find that the thickness of the sole which has been allowed to grow is so great that an ordinary shoe can be fixed for the moment, and that on return home this can be easily again replaced by the Charlier shoe; and I have M. Languet's authority for saying that he has never had an instance of a horse in which this could not be done.

And now, having briefly described the system and its advantages as brought before the jury, I will give the opinions of some of the veterinary surgeons and horse proprietors whom I had the honour of seeing, with the intention of ascertaining their views upon this subject.

Opinions of
veterinary
surgeons
and others.

My first visit was to M. Languet, above mentioned. This gentleman is one of the largest jobmasters in Paris; at his stable in the Chaussée d'Antin he has upwards of 100 horses, all of which are hardworked daily in the streets of Paris—"cet enfer des chevaux." About three years ago he commenced M. Charlier's system of shoeing. A few horses were first tried; finding it succeed he has now adopted it for the forefeet of all his horses. Being rather more expensive than the ordinary method (a difference of 35 c., or 3½d. per shoe), he does not use it for the hind feet, which

M. Languet.

CAPTAIN
COCKERELL
ON
SHOEING
HORSES.

seldom have anything wrong with them. Monsieur Languet finds that he has two thirds fewer of his horses suffering from lameness than he used to have, and that he gets more work out of his stable than he did.

A horse casting a shoe some miles from home is driven in without being shod, the thick sole, which is allowed to grow, offering resistance enough for even a couple of days' moderate work. Horses hired to go into the country for a time are shod in the ordinary manner, and immediately on their return to Paris are reshod with the "Charlier" shoe. No difficulty is found in doing this.

The shoes of the new system are found to last quite as long as the old—about twenty-nine days. Since its introduction, certain classes of diseases of the feet (sand-cracks, for instance) have entirely disappeared from M. Languet's stables. Through the whole of the hard frost last winter he did not find it necessary to rough his horses.

Chemin de
Fer de
l'Ouest.

In the dépôt of the Chemin de Fer de l'Ouest, at the Gare St. Lazare, I found that 600 horses had been for upwards of a year shod in this manner. These horses are very large and heavy, being used in omnibuses, and the carts that convey goods from the station into Paris.

The veterinary surgeon and other officials I saw there expressed themselves perfectly satisfied with the system. All their farriery being done at their own yards, I inquired if they found any difficulty in instructing their smiths in the new method. I was assured they had found none whatever, and that an intelligent man was quickly able to master the details. They were of opinion, however, that their farriers were unusually good, many reasons combining to make the service of the company in this branch very popular.

In this establishment horses with defective feet had frequently been shod with shoes weighing upwards of 4 lb.; the heaviest shoes now used never amount to 2 lbs. The veterinary surgeon was convinced that this relief enabled the horses to do more work than formerly, with less fatigue. None of the company's horses were roughed during the frost last winter. Their horses now fall less by half than they did previously; and whereas 300 shafts and poles a year were formerly broken, not one third of the number were so this year. Disease of the feet had almost disappeared from the company's stables.

M. Signol.

At the time of my visit to M. Signol I found that gentleman engaged in writing a report on the Charlier system of shoeing for the information of the directors of the General Omnibus Company of Paris, of which he is the able veterinary surgeon. Nearly 600 horses of the company are

now shod in this manner, and I here give some extracts from the report which M. Signol was kind enough to send me. He says:—

“Shoeing on the ‘Charlier’ system was commenced at the dépôt at Monceaux, on Jan. 13, 1866, and the following are the results up to Jan. 6, 1867. The three classes of services on which these horses are employed are—1st, the regular service; 2nd, the service of ‘La Côte;’ 3rd, the relays. In the first class, 4,262 fore shoes have been used, giving an average use of twenty-nine days and one tenth; and 227 hind shoes, giving an average of twenty-five days and five tenths. To the horses performing the service of ‘La Côte’ (the extra horse put on to assist up steep inclines) 428 front shoes have been applied, giving an average of twenty-four days and nine tenths, and 17 hind shoes, giving an average of twenty days and seven tenths. Whatever kind of shoes be used, this service of La Côte invariably wears them out quicker than any other work. To the relay-horses 227 fore shoes have been applied, lasting thirty days and two-tenths, and 7 hind shoes, which lasted twenty-eight days and one tenth. This gives therefore an average of about twenty-nine days for the front, and twenty-six days for the hind shoes for ordinary work, not including the service of La Côte, which is exceptional.”

M. Signol then proceeds to state his reasons for abandoning the Charlier shoeing for hind feet; they are as follow:—

1. The hind feet, being of different construction, and having a different action from the fore, are not so liable to disease.
2. The peculiar work of omnibus horses wears out the hind shoes quickly at the toe where they grip the ground; the shoe is then forced open, tearing itself away from the foot.

In spite of this, M. Signol thinks that some way of utilizing the system for all four feet could be found.

The report then proceeds:—“The first advantage of this shoeing is its lightness—it weighs at most, from 850 grams. to 900 grams. (28 oz. to 30 oz.); the old-fashioned shoe weighs from 1,150 grams. to 1,200 grams. (38 oz. to 40 oz.) A weight, therefore, of 300 grams. (10 oz.) is removed from each foot. The economy of labour resulting from this relief is easily understood.

“The second advantage consists in leaving the foot its natural shape;” and here I cannot do better than quote M. Signol’s own words on the subject:—

“Vous comprendrez sans peine, MM., que ce fer encrusté, dilatable laissant aux arcs boutants toute leur force, maintient l’écartement du talon, et permet à la fourchette de venir porter sur le sol, pour remplir son rôle de tampon

CAPTAIN
COCKERELL
ON
SHOEING
HORSES.

d'amortissement destiné à éteindre les réactions violentes que ne peut manquer de produire sur les membres et les autres organes le poids du cheval multiplié par la vitesse, quand il vient remonter le sol. Ceci est un second avantage qu'on pourrait décomposer mathématiquement, mais qui se traduit d'une manière pratique par l'élargissement très appréciable des talons, après un certain temps de l'usage de cette ferrure. Ces avantages ne sont pas les seuls. Par suite des données physiologiques que j'exposais plus haut, les arcs boutants conservant toute l'intégrité de leurs fonctions, les bleimes deviennent beaucoup plus rares. D'où, une source de moins d'incapacité de travail, de frais de traitement, et de complications quelquefois fort graves. Il en est de même pour une grande partie des seimes quartes qui se déclarent aux membres antérieurs. Un cheval faisant le service de Mr. J—— M——, administrateur de la cavalerie, a été guéri de deux seimes quartes, sans l'emploi d'autres moyens de traitement, bien qu'avant l'emploi de la ferrure Charlier il fallut les apérer assez fréquemment, et tenir le cheval indisponible pendant un temps plus ou moins long.

“Le côté hygienique de la question peut donc se résumer ainsi :—1, Allégement du fer et économie des forces employées à soutenir un poids inutile ; 2, conservation de l'intégrité fonctionnelle du poids ; 3, amortissement des réactions, et par suite, conservation des membres.”

Action of
French Go-
vernment.

It will naturally be asked what action the French Government have taken with reference to the introduction of the system into the mounted branches of the army. From the inquiries I have made I am led to believe that up to the present moment it has never been thoroughly and properly tried in any regiment of cavalry or battery of artillery. An officer from the mounted branch of the service is at this moment charged with the duty of making a report on this and other systems of shoeing. — He tells me he has formed a favourable opinion of M. Charlier's theory, but that he considers a long practical trial would be necessary in some mounted regiment before a decided verdict as to its merits could be pronounced.

Army
horses.

In a visit I paid to a regiment quartered in Paris, I found four horses had been shod in this way, and the veterinary surgeons spoke highly in its favour. There are, however, difficulties in the way of its general introduction into the army that should be noticed. The farriers in the French service supply the horses' shoes ; and as the Charlier iron is at present made entirely by hand, and is rather more expensive than the old pattern, it naturally follows that the farriers are not particularly anxious for its adoption. Of

course, this objection would be overcome should its use become general, as it could easily be manufactured by machinery, and, weighing less than the common shoe, would consequently be cheaper.

The parings of horn from the horses' feet, under the old system, is also a source of revenue to all farriers; under the new, which allows of no paring, this perquisite would therefore at once disappear.

The farriers, too, in the French army are only enlisted for a very limited period, and, having learnt a trade while serving with the regiment, do not often re-enlist, as they can be more advantageously employed elsewhere. The consequence of this is that few of them acquire any great experience, and the veterinary surgeon cares not to highly educate a man whom he must lose at the end of a short period. The introduction and proper trial of the system on a large scale would therefore require some time, expense, and trouble.

M. Charlier informed me that the colonel of a dragoon regiment was trying this shoeing on his private horses in England. He expressed some doubts, however, whether a shoeing-smith who had never seen the operation properly performed, nor had demonstrated to him the many minutiae to which great attention should be paid, would be capable of thoroughly carrying it out.

Trial of
"Charlier"
system in
England.

In conclusion, I would suggest that a system so highly approved of by the jury and now so largely used in Paris would be worth a trial in England. Any method by which we can preserve our horses from lameness, or cause them to work a year or two longer for us, is a benevolent economy which it behoves us well to try, to say nothing of the duty we owe to our most valuable and useful servant, the horse.

REPORT ON PRODUCTS OF USEFUL INSECTS.—(Class 81.)—
By Mr. ANDREW MURRAY.

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

THE objects falling under this class are few, being, with the exception of some cochineal insects from the Cape, some specimens of bleached shellac, and a number of admirable contrivances relating to the housing and management of bees, limited to collections of silk. What there is of novelty in these exceptions is trifling and of no particular interest, and the present report must therefore be confined to silk. Scope of class.

The exhibits of silk are of two kinds—the silk produced Silk. by the mulberry silkworm and that produced by other species of silkworm. The former, notwithstanding the devastation caused by the disease which, for the last twenty years, has ravaged the silk-producing countries, would lead no one to suppose that the silk industry was suffering from any depression. The silk exhibited is as fine and beautiful as at any former period; but, although fair to the view, and apparently abundant, it is silent on the most important point—the amount of production. It does not and cannot tell the quantity of silk actually produced during the previous year, and still less the quantity which would have been produced but for the existence of the disease. We must draw our information on these points from other sources.

Those who are unfamiliar with the silk-producing countries can have little idea of the anxiety with which the progress of the disease is there regarded, nor of the amount of misery which it threatens to inflict on vast numbers of the inhabitants. Although, therefore, there is nothing, so far as I observed, exhibited, bearing direct relation to the disease, there is so much indirectly bearing on it, that I feel that I should leave a very important part of my duty undischarged if I said nothing in this report about the silkworm disease. Silkworm disease.

Ever since the silkworm was introduced into Europe it has been known to be subject to various diseases; and some good authorities are of opinion that the malady which has latterly proved so fatal has always been present in a modified state, only showing itself in its more virulent aspect from time to time when peculiar conditions stimulated its development. The more general opinion, however, is, that it is a new disease, unknown prior to 1842, and appearing as an epidemic like cholera; not taking the place of other known diseases, but often combining with them, and, by first sapping History of disease.

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

Kinds of
disease.

Pebrine
disease.

the constitution of the insect, rendering it an easy prey to any of the other diseases which might attack it; as in ourselves a man attacked by incurable phthisis may be suddenly carried off by typhoid fever, sharp enteritis, or other less fatal complaints.

From twelve to fourteen well-marked distinct diseases have been observed in silkworms; and naturally these have been chiefly studied in the caterpillar, which is of course more under the observation of those who occupy themselves with this industry than any of the other stages of the life of the insect.

This is not the place to give an account of these different diseases, but it may be interesting to the reader to know something of the nature and appearance of the pebrine, the epidemic which has been so destructive of late years. The distinguishing mark of this disease is the presence of dark spots—*peppered*, as it were—all over the insect (whence the name Pebrine, quasi *poivrine*); and these not confined to the surface, but extending all through the tissues and substance, even into the blood; the nervous system being the only part in which they have not been observed; but in it, too, traces are doubtless present. Fig. 1 shows a diseased caterpillar (a little enlarged), and fig. 2 a portion of its back more highly magnified. The spots there indicated are found

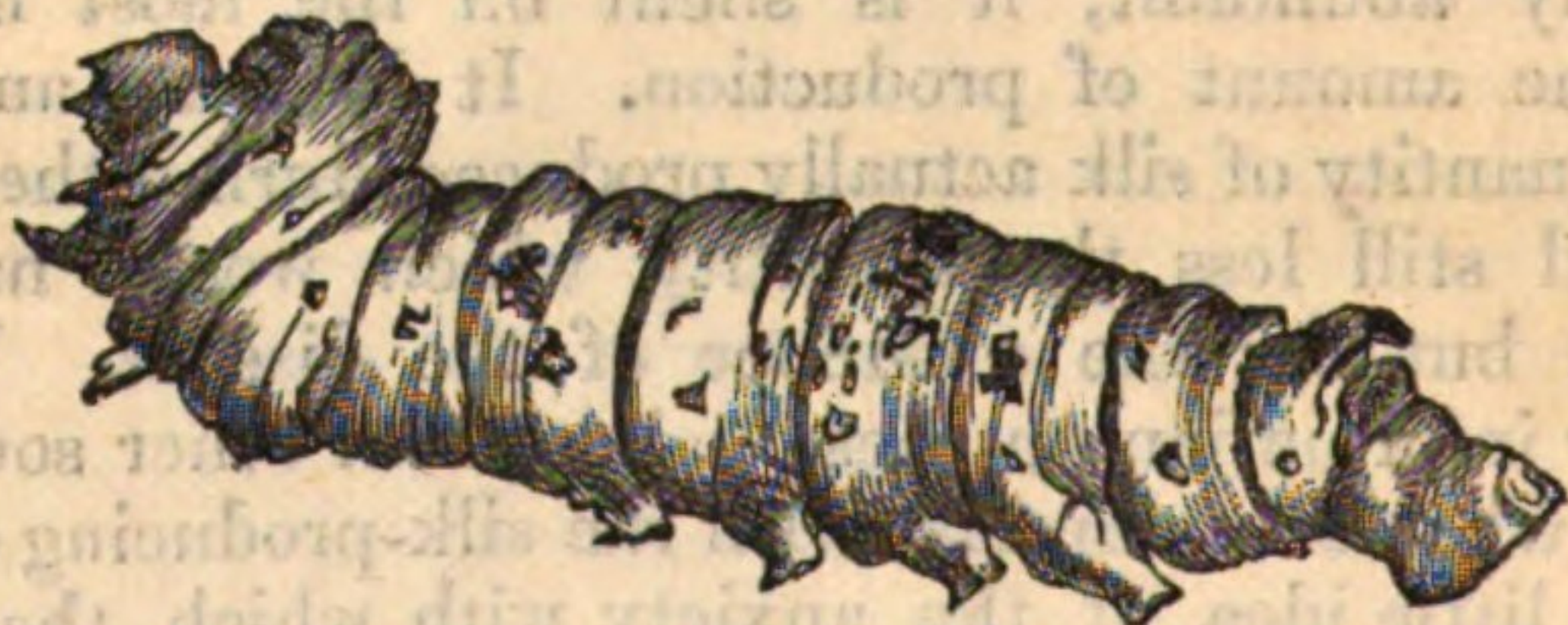


Fig. 1.—Diseased silkworm, slightly magnified.

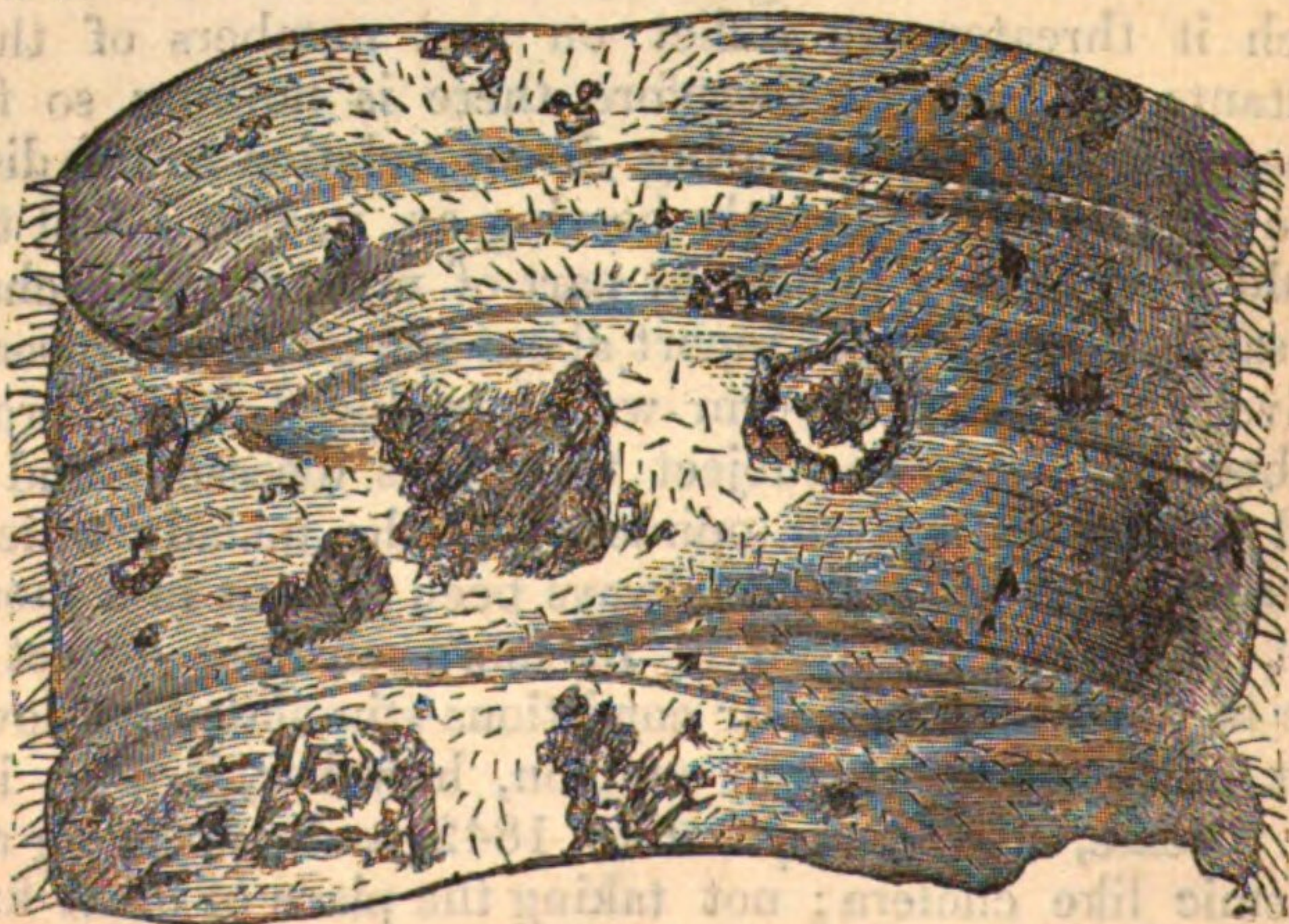


Fig. 2.—Portion of back of diseased silkworm, much magnified.

also in the chrysalis and perfect insect, the very scales of the moth (fig. 3) being slightly spotted too. The disease

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

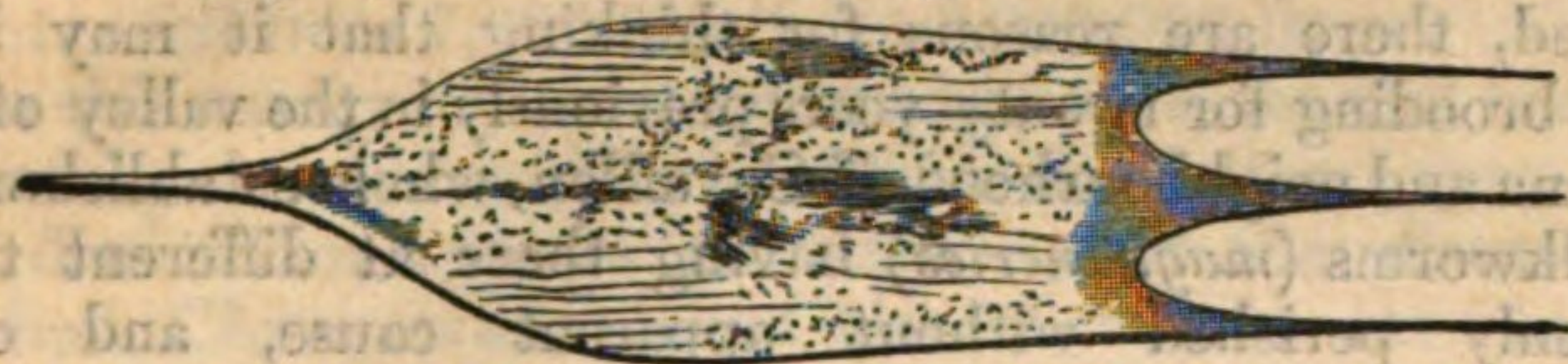


Fig. 3.—Scale of silkworm moth, showing the disease, magnified.

does not shew itself, however, until after the third moult; and in many cases, when the worms seem healthy, it requires an examination by a lens or microscope to detect the spots, they are so minute. Generally speaking, the insect does not die in the caterpillar state; many do, but the majority have strength to spin their cocoon. Some then die; others survive until they appear as the perfect insect, and even attempt to propagate their species, but their eggs are either addle or the caterpillars which come out are infected with the disease, it being hereditary, and die before spinning. A curious symptom, and one which distinguishes this disease from the muscardine, with which, in other respects, it has analogy, is that the dead body of the caterpillar desiccates and mummifies in the former, while it speedily putrefies in the latter. As already said, it has been compared to the cholera and other epidemics; and it certainly has many points in common with them. Like them, bursting upon a country suddenly and with fearful destruction, without warning, progressing steadily from place to place, often taking great leaps, often mysteriously passing over one place untouched while sparing nothing in a neighbouring locality, usually becoming mitigated before hygienic precautions, although at times it bids them defiance; now disregarding robustness of individuals, and again sparing the most careless, neglectful, and feeble; but, although conducting itself as an epidemic when once established, it differs in some important respects from all previous epidemics. The cholera, the plague, the bloody sweat, the black death, the cattle plague, all came from the East; either the centre of Asia or the Indo-Malayan district was the focus from which they proceeded. The Asiatic cholera, for example, confined for many ages to the delta of the Ganges and its neighbourhood, first spread itself into the Indian Archipelago, then returned to India and made itself master of the whole of it; and, after stopping there for a sufficiently long time, it successively invaded Asia, Europe, America, and the whole world. It was not so with the silkworm epidemic. It did not come from the East. It

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

first showed itself in France in 1842, in Herault and Poitiers, and then only in a local and erratic manner. Indeed, there are reasons for thinking that it may have been brooding for twenty years previously in the valley of the Durana and neighbourhood of Cavaillon, whole establishments of silkworms (*magnaneries*) having there at different times suddenly perished without apparent cause, and other symptoms having shown themselves which are now known to be those of the pebrine. Whether it was so in these cases or not, there is no doubt that when the disease showed itself as an epidemic it took its rise in the department of Vaucluse, and in the neighbourhood of Avignon, in 1845. It appeared independently in these different places at one and the same time. The progress made by the epidemic was not very great until 1855 and 1856; but it then increased so rapidly that in 1858 M. Quatrefages (in an examination which he made of the infected districts as commissioner from the Institute, and from whose report we draw most of our information regarding the disease,) could not find a single caterpillar in the districts he visited free from the disease. Some change for the better took place in 1859; but since then a gradual and alarming increase in the intensity and spread of the disease has taken place.

Statistics of
silk produce,
showing
progress of
disease.

From returns prepared by Mr. Eaton, the eminent silk-broker, we learn the amount in pounds avoirdupois of the consumption of raw and thrown silk, in Great Britain*, in each of the years from 1851 to 1856. It is unnecessary to say that the consumption bears a very close relation to the supply; when we know the one we can form a good guess at the other.

Lb.

In 1858	the British consumption	amounted to	10,021,766
In 1859	"	"	10,429,338
In 1860	"	"	9,096,826
In 1861	"	"	8,125,982
In 1862	"	"	9,706,202
In 1863	"	"	8,182,645
In 1864	"	"	7,541,578
In 1865	"	"	6,492,720
In 1866	"	"	5,273,767

Taking each country by itself, we could trace the date when the epidemic struck it by the diminution in its exports. China, for example, in 1857, when Italy and France were already prostrated, sent four fifths of the whole importations of Britain, or 9,000,000 lb. out of

* We have not the same data as regards France, but her consumption seems to be generally about double that of England.

11,500,000 lb. The epidemic did not strike China heavily until 1864, when in one year our importations from that country fell from 7,000,000 lb. to 3,000,000 lb.

In this survey we must remember that the evil has only spread by degrees, and it is only in the latter years, when the diminution appears prominent, that the disease has reached China, while the Chinese returns are an all-important element of the calculation, for China, before the epidemic appeared, used to supply more than half our consumption.

The prices tell the same tale, having risen about one third since 1856—the highest price of raw Chinese Tsatlee silk having gradually increased from 19s. 6d. in 1856 to 32s. 6d. in 1866, and of Italian white Novi having, in like manner, increased from 30s. in 1856 to 46s. in 1866.

Wherever the disease appeared, the result was the speedy clearing off, almost the annihilation, of all the silkworms in the district; and the complete extinction of the silk industry in these localities would have necessarily followed had it not been that every place was not attacked at the same time. Consequently, the silk-growers, by procuring *graines*—that is, seed or eggs—from the districts which the epidemic, in its capricious course, had passed over, were enabled year after year to keep their magnaneries going, obtaining only a half crop, but no good *graines*, from them for next year. As the epidemic has rarely if ever left a place where it had been once established, each fresh introduction of eggs lasted only one year, and the silk-grower was thus left dependent for next year's worms on the chance of his procuring a fresh supply of *graines* from some uninfected district. At first one parish or one department helped another, but by-and-by the epidemic had extended itself so widely in France that the healthy spots were insufficient to provide the necessary supply of seed for the wants of the rest of the kingdom. Supplies of seed were then drawn from neighbouring countries which had as yet escaped the scourge. At first Spain and Piedmont, then Lombardy, and afterwards Calabria and the rest of Italy, were had recourse to; but by-and-by the epidemic extended itself successively into them: and then supplies were drawn from Turkey, Asia Minor, and Syria. These in their turn suffered; and the disease rolled on (against the usual course of epidemics), eastward, into Asia. In 1858 it had appeared in various parts of Persia, as far as the shores of the Caspian Sea. In 1859 it had reached the Russian provinces beyond the Caucasus; and at that time M. de Quatrefages thus expressed himself as to the future supply:

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

Prices showing progress of disease.

Consequences of disease.

Introduction of *graines* from abroad.

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

Future
supply of
graines.

Graines
from Japan.

Production
of *graines*
as a sepa-
rate branch
of industry.

—“We must expect to see the countries which have hitherto escaped, attacked in their turn. But where, then, shall we go to seek the 50,000 kilogrammes of *graines* (eggs) which we require? Shall it be in Central Asia? Shall it be in China? But who dare affirm that these two countries will always escape this scourge? Already India, and even some part of China, seem to feel the first symptoms (‘Observations of M. the Count Freschi;’ ‘Letters from Chang Hai, in the bulletins of the Society of Acclimatation of France,’ December 1859). But, admitting that the northern parts of that empire—probably the native country of the silk-worm—should enjoy complete immunity, how shall we carry these *graines* to France? Shall it be by land or by sea? Shall we double the Cape of Good Hope or cross North America? All these hypotheses suppose journeys by land bristling with obstacles of all kinds, or else a long passage accomplished in a great measure under the line and the intertropical zones. In both cases the maintenance of the *graines* in good condition is almost equally difficult, if not impossible, as soon as any considerable consignments are concerned” (‘Quatrefages sur les Maladies Actuelles du Ver à Soie; Mémoires de l’Institut Impérial de France; Académie des Sciences, xxx., p. 597, 1860”). One part of what M. de Quatrefages foresaw and dreaded has come to pass. The places which had escaped up to the time he wrote (1859), and from which the supply of *graines* had been hitherto drawn, were gradually seized upon by the disease, and the European cultivators have been driven to draw their supply of eggs from China and Japan. But what he did not consider possible—viz., to send the eggs from these distant lands—has been accomplished; the ingenuity of man has found a way of transmitting them thence in safety and in quantity. The eggs are closely spread over and glued upon a sheet of stiff paper, which fits into a slide in a shallow carton or box, in which they are dispatched. The exclusion from the air seems to prevent their coming out during the passage to Europe, and they have been found to arrive in perfect safety and good order. In fact, a great commerce in them is already established between Europe and Japan.

But when Japan in its turn shall succumb, whence will the supply then come, and where will the silk cultivation and silk manufacture find itself, if no other source of supply can be discovered? If no change comes, there seems nothing but total extinction before them. M. de Quatrefages anticipates a less melancholy termination. “If the present

epidemic," says he, "comports itself to this end, like other maladies of that kind, as it has done hitherto, it will become extinguished by degrees in the countries which were first attacked, in proportion as it develops itself in new countries. According to this view, France would be the first free, and that at the very time when Central Italy, Turkey, and Asia Minor would be the most severely struck. In their turn these regions would be forced to borrow from without the means of saving their silk industry. We should have then to furnish *graines* to these very countries which have been selling them to us for so long a time. I should not wish to give rise to exaggerated hopes, but everything leads me to believe that things will happen in that way, and perhaps the moment is not distant when our cultivators may find in this the means of repairing in part their past losses" (Quatrefages, Op. cit., p. 598). He, therefore, recommends them *se remettre en graine*, to use the French colloquial phrase, equivalent in English to "to go in for *graines*." It may be worth consideration whether it would not answer in the south of England to rear silkworms for this purpose.

Unhappily, the apparently just expectations of M. de Quatrefages regarding the course which the disease might be expected to follow have not been realized. And why? His anticipation was a most reasonable one. All past experience justified it. Why has it not been fulfilled? Why has this epidemic alone of all epidemics which have been, since the world began, refused to go the way of the others? They, after attacking a country and killing off all that were susceptible to their influence, have, after a time, uniformly taken their departure, and gone on to ravage other lands, leaving a remnant of the creatures attacked to restore the race. Their course has been like that of a devastating army or a flight of locusts. When they have eaten up a land they leave it and resume their course in search of fresh food in other regions. Why has not the silkworm epidemic done so too? Is there any peculiarity in the way it has been met or difference in its treatment? If there is, we may reasonably look to that difference for the explanation. So looked at, the cause is patent and under our hand. The epidemic has not been left to run its natural course, as other epidemics have. A new element has been introduced by man, which was present in no other epidemic. It is the introduction of *graines* every year. If, after a flight of locusts had consumed every green leaf in a land, and was about to take wing for pastures new, a fresh supply of

Cause of
continuance
of disease.

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

vegetable food was brought them, we could not be surprised that they still remained to eat up the new fodder; if, when an army has exhausted the resources of a whole district, and is about to be compelled to move into new quarters to procure subsistence, an ample convoy of provisions and material reaches them, we may assume that their departure will be postponed until that provision has been exhausted. So it is with this and all other epidemics when once established; the only means of getting rid of them is by process of exhaustion; the only cure yet found is by starving them out; when all that is food for them has been consumed, then they will die out, but not until then.

Suggestion
that con-
tinuance
of disease
may be due
to constant
introduction
of fresh
graines.

The great evil in the present case, and the direct cause of the threatened extinction of the silkworm, appears to me, therefore, to be the yearly introduction of fresh eggs, so that a new supply of victims is constantly presented to the disease ere it has left its ground. The effect of this upon the district is twofold. In the first place, the disease consumes all the new comers that are susceptible of its influence; and in the next place it consumes any similarly susceptible produce of the old residents of the previous year, so that the descendants (or what in man would be the survivors) of those which had been first attacked become fewer and fewer each year. In fact, these latter must soon be all extinguished, and the future survivors will consist of the residue of the fresh supplies. With our attention once directed to it, it is not difficult to trace indications of the action of a similar principle in other epidemics. I would cite the constant presence of the plague in Mecca so long as the immense yearly concourse of pilgrims to that shrine continued, and the frequent seizure of cattle, supposed free from the cattle plague, so soon as they reached an infected shore, as illustrations in point. I might also refer to the condition of wild butterflies and moths of other species at the time (1857 and 1858) when the Pebrine had reached its full development in France. Not only M. de Quatrefages himself (Op. cit., pp. 373, 620), but various other observers, noticed that the wild caterpillars were attacked apparently by the same disease as the silkworms. They were found dead in numbers; and he records the information, communicated by different observers at different localities, that the absence of butterflies and caterpillars at that time was peculiarly marked. But that lasted only for a season or two. There was no fresh importation of *graines* in their case to disturb the natural course of the epidemic. It ran its course and disappeared. But this is not the place to argue the question.

To do so satisfactorily would require a careful sifting of the phenomena observed in other epidemics, and the elimination of those due to other causes from those referable to this. All that I can do here is to suggest the explanation. If it be well founded, it is plain that there is a remedy which would save France from the threatened calamity—simply to prohibit the importation of fresh *graines*. The disease, deprived of this fresh fuel, would expire of itself; but the silkworm might not expire too. No epidemic within the knowledge of man has, when left to itself, ever exterminated a breed; a remnant to restore the race has always been left. In a year or two it would begin to restore itself; or, if no remnant were left, it could be safely supplied with *graines* from abroad, when once the country were cleared from the infection hanging about it. The remedy is, no doubt, a sharp one, but so is the disease; and who ever heard of a remedy that was not painful? It would entail, probably, a complete destruction of the industry for one, or perhaps even two whole years; and the distress would, like our cotton distress, be great. Like it, too, it would be afterwards hampered by the loss of good hands who had turned their attention to other occupations during the temporary cessation of their ordinary work; but all that would be got over again; and, if the step were taken now, France would have her silk industry prosperous and buoyant by the time that that of all the rest of the world was in despair.

It is true that no epidemic has ever yet been known to utterly destroy a race; but we have had no experience of an epidemic among insects. This is the first instance that we have had of such an event, and we cannot tell how it may affect them. Its course having been interfered with by man, we cannot say how far the same rules, which we see in epidemics affecting the higher animals, will apply to it. When an epidemic has attacked the higher animals, those who have escaped survive in their own persons; and, as they have proved not to be susceptible to its influence in the first instance, may be regarded as tolerably safe for the future. But the insect is an annual; we are perennials. It dies off, in its own person, naturally each year, and the epidemic next year has to deal, not with an insect which has already passed the ordeal, but with its progeny, which may not be able to do so. The result, then, of an established focus of infection throughout the country may be on the cessation of the introduction of fresh *graines*, sooner or later, to extirpate the whole breed. While things jog on as

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

before from year to year, the cultivator will be slow to believe it possible that a time may come when no fresh *graines* are to be had. But the supply hangs upon a thread; when every silk country in the world shall have become infected, then the supply must cease. And we are not far from that stage. Japan and Australia are the only countries now free. When they go, will not the trade collapse, and silk be blotted from the list of textile fabrics. That, indeed, would be a calamity which would come home to ourselves. Our silk spinners and silk weavers, our ribbon makers, our silk mercers, and the thousands who depend on these trades for subsistence, would have their occupation gone, and ruin and starvation would await a large portion of our population. Surely, to avert such a result, not only in this country, but also over a large part of the Continent, deserves that every suggestion which promises escape should be carefully considered; and surely, if by any measure, however stringent, one country could be cleansed from the infection before its spread ends in a complete extinction of the race, and so the threatened ruin be averted, it ought to be adopted.

Introduc-
tion of new
kinds of
silkworm.

At the very time that the epidemic was working its way from its first centres up the Valley of the Rhone, previous to spreading, like a thunder-cloud, over the whole of the south of France, a number of entomologists (unknown to each other and in ignorance of the use to which their inquiries might soon be put) were making experiments on the introduction of different species of silk-producing moths into Europe. At the Exhibition of 1851 not a single exhibit was made of any silk but that of *Bombyx mori*; but, curiously enough, by 1855 many experiments had been made, and a most interesting collection was shown at the Exhibition of that year by M. Guerin-Meneville, who has since specially devoted himself to this object; and it may justly be said that, as he alone now exhibits in the class of silks produced by other species than the mulberry silkworm, so he is fairly entitled to represent the whole of those who have been working in the same direction. It is to his superior energy, perseverance, and skill that the introduction of new species is almost entirely due. Those have been effectually seconded by the solid patronage extended to him by the Emperor, and also by the co-operation of the Acclimatisation Society of France.

M. Guerin-Meneville's collection in this exhibition is not lighted up by any display of silk-producing insects or other collateral illustration, such as added interest to his exhibition

in 1855; but he states that his present exhibits have not been made with any view to effect, but as a practical index of the progress made in the effort to introduce new species since 1855. The importance and interest of the subject itself is rightly held by him to be sufficient to secure attention without any adventitious aid.

Although, of course, the attempts to introduce new silk-worms have naturally extended to every silk-producing insect on which the experimenters could lay their hands, they have practically been confined to two, which were found the most manageable and most promising. Experiments with other species are now going on both in Europe and abroad, and before another ten years' elapse fresh results will undoubtedly have been obtained; but as the question at present stands, and more especially on the exhibit to be reported on, there have been practically only two kinds seriously tried. M. Guerin-Meneville and some other entomologists consider that they have been dealing with five species, the two to which I allude having been divided by them respectively into three and two species; but other entomologists of not less standing, among whom may be mentioned M. Boisduval, reckon them only as two; and for general purposes it will be sufficient to consider them as two typical forms, of which there are sub-species or varieties, probably produced by the different conditions of the different districts from which they come.

These two typical forms are—

1. The Tusseh moth (*Antheræa paphia*, or *myletta*, of entomologists). This insect follows the range of the Himalayas from the most western limits of Bengal, through North India, and thence through Northern China (Mantchouria) into Japan, and in each of these districts—India, China, and Japan—it has assumed peculiarities which have served to distinguish them as above mentioned. (1) The Indian form is the *A. paphia*, or *myletta*; (2) the Chinese form is the *A. pernyi*; (3) the Japanese form is the *A. yama-mai*. Tusseh moth.

2. The Arrinda or Ailanthus moth. There are two forms of this type:—(1) *Attacus arrinda*, or *ricini*; (2) *Attacus cynthia*;—the former from India; and the latter, with a more extensive range, running into Japan. Arrinda or Ailanthus moth.

These two different types, the Tusseh and the Ailanthus, differ essentially from each other.

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

Figs. 4 and 10 respectively represent the moths of each; fig. 4 being that of the Japanese variety of the Tusseh (*Antheræa yama-mai*), and fig. 10 the Japanese variety of the Ailanthus worm (*Attacus cynthia*).

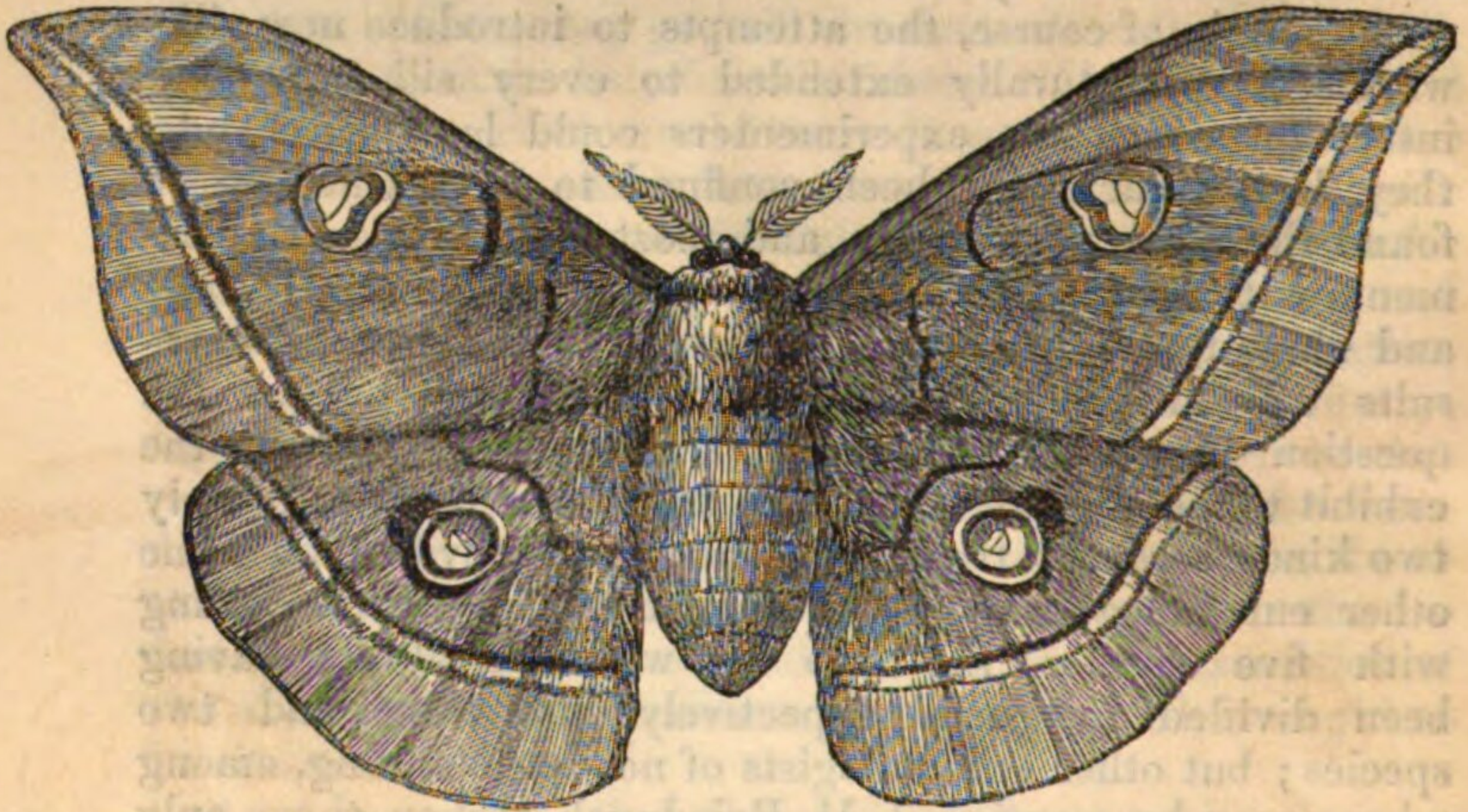


Fig. 4.—*Antheræa yama-mai* (Japanese variety of Tusseh moth).

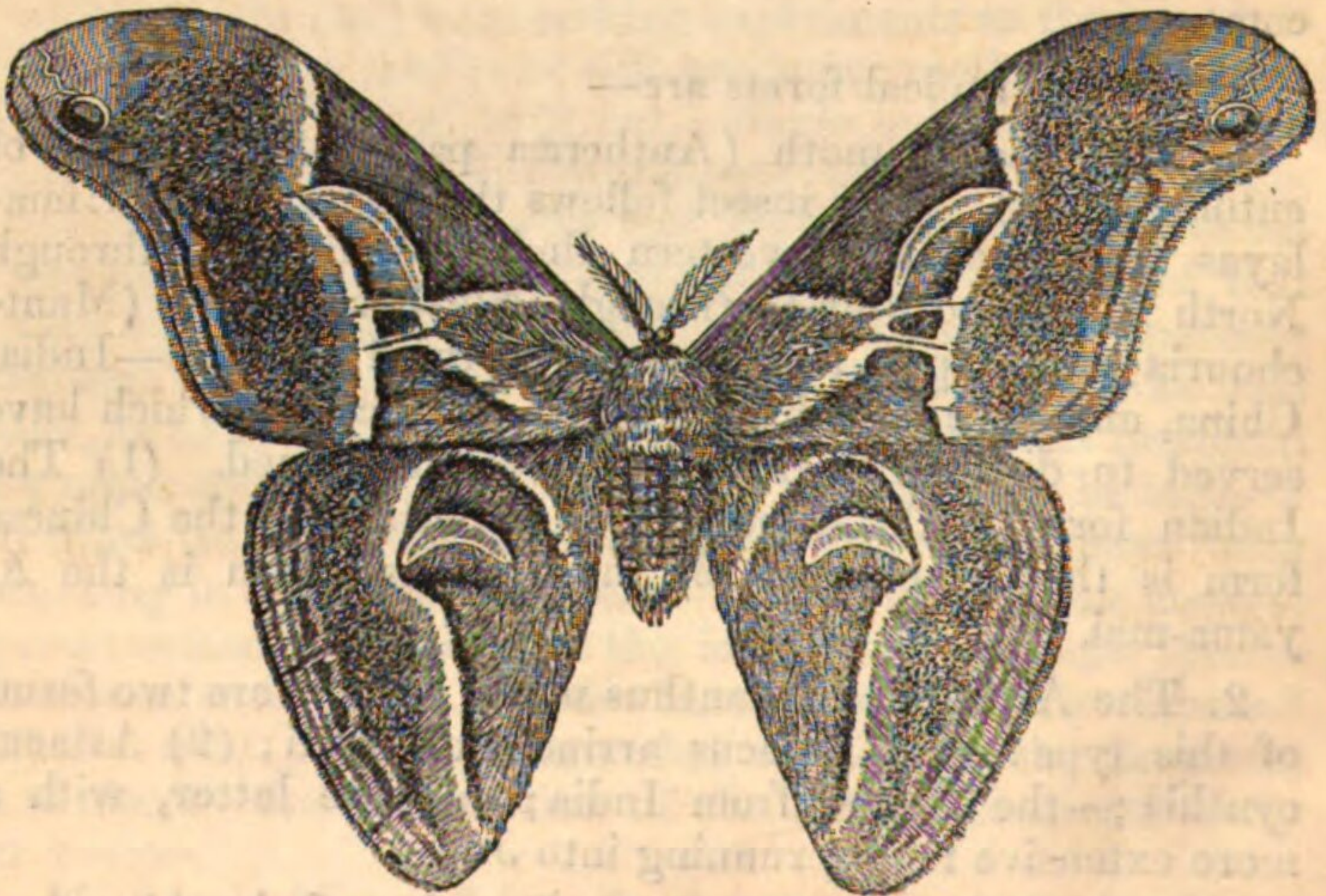


Fig. 10.—*Attacus cynthia* (Japanese variety of Ailanthus silkworm moth).

Figs. 5 and 11 represent the respective full-grown caterpillars of each.

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

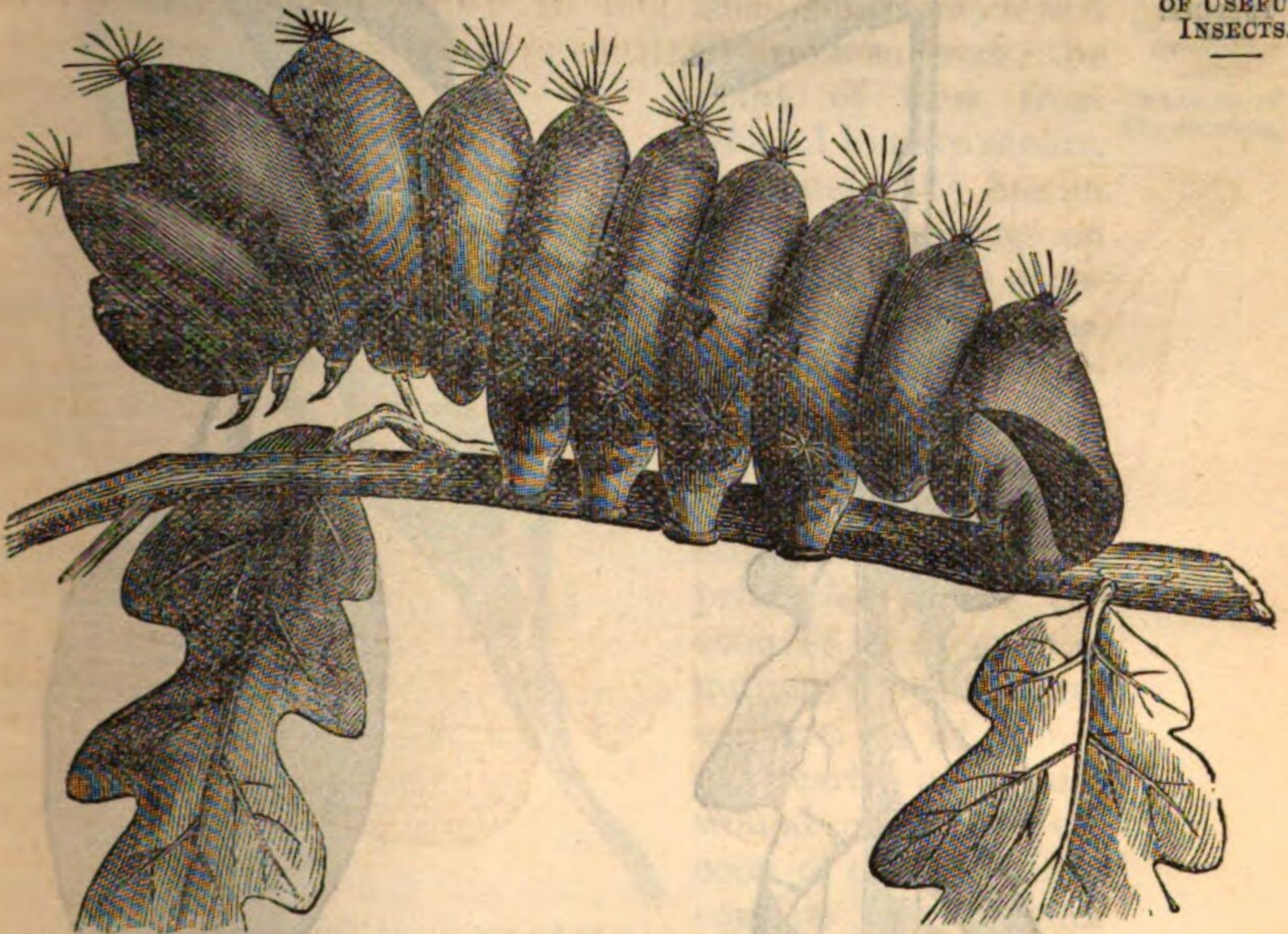


Fig. 5.—Full-grown caterpillar of *Antheraea yama-mai* (variety of Tusseh moth).

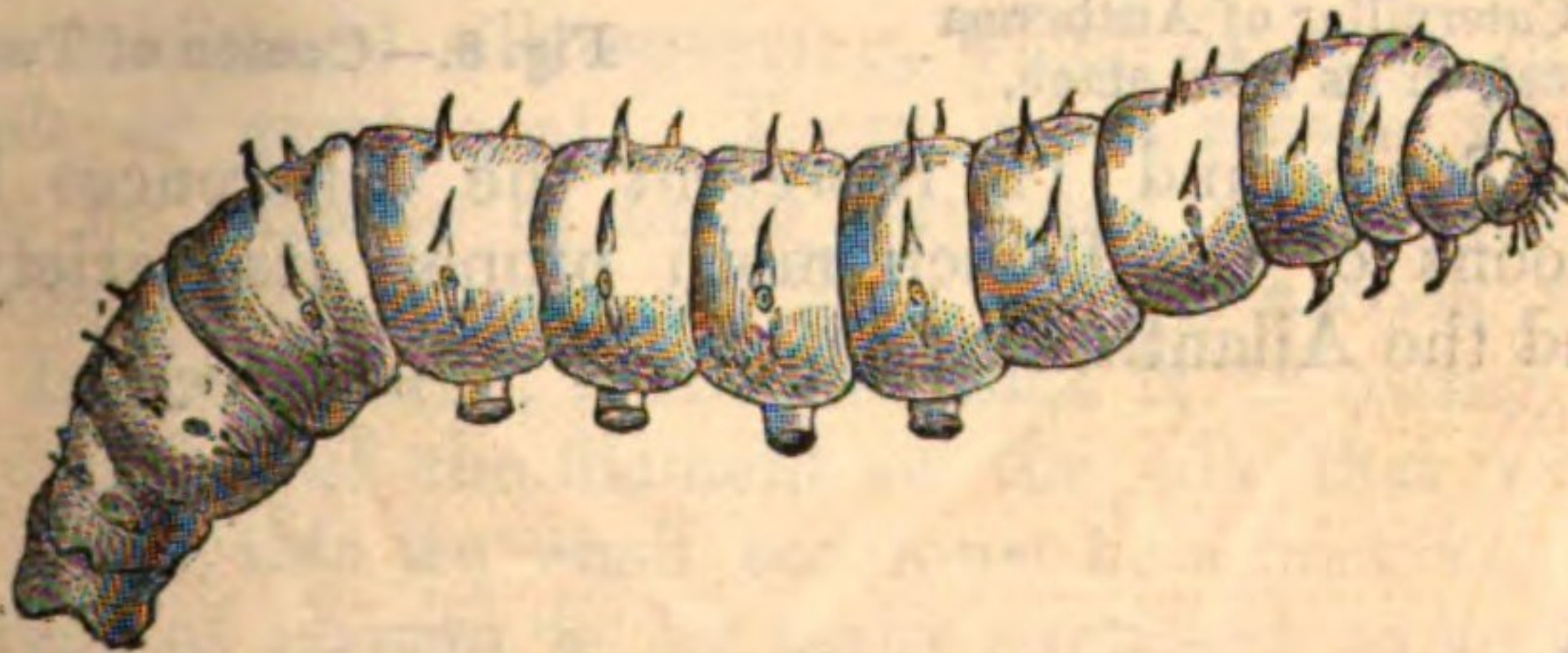


Fig. 11.—Full-grown caterpillar of the *Ailanthus* silkworm.

Figs. 6 and 7 represent the young caterpillars of the yama-mai at their first and third month.

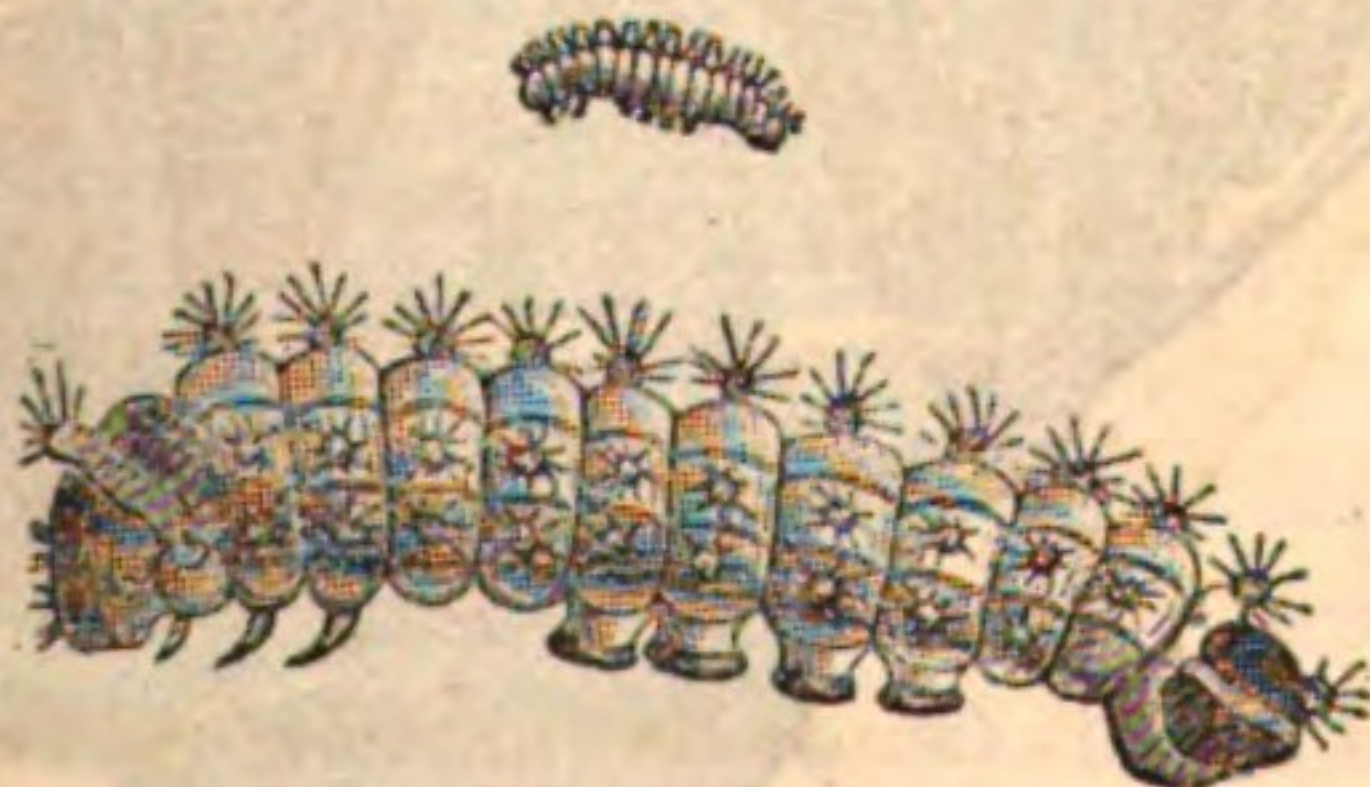


Fig. 6.—Caterpillar of the *Antheraea yama-mai*, in its first stage.

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

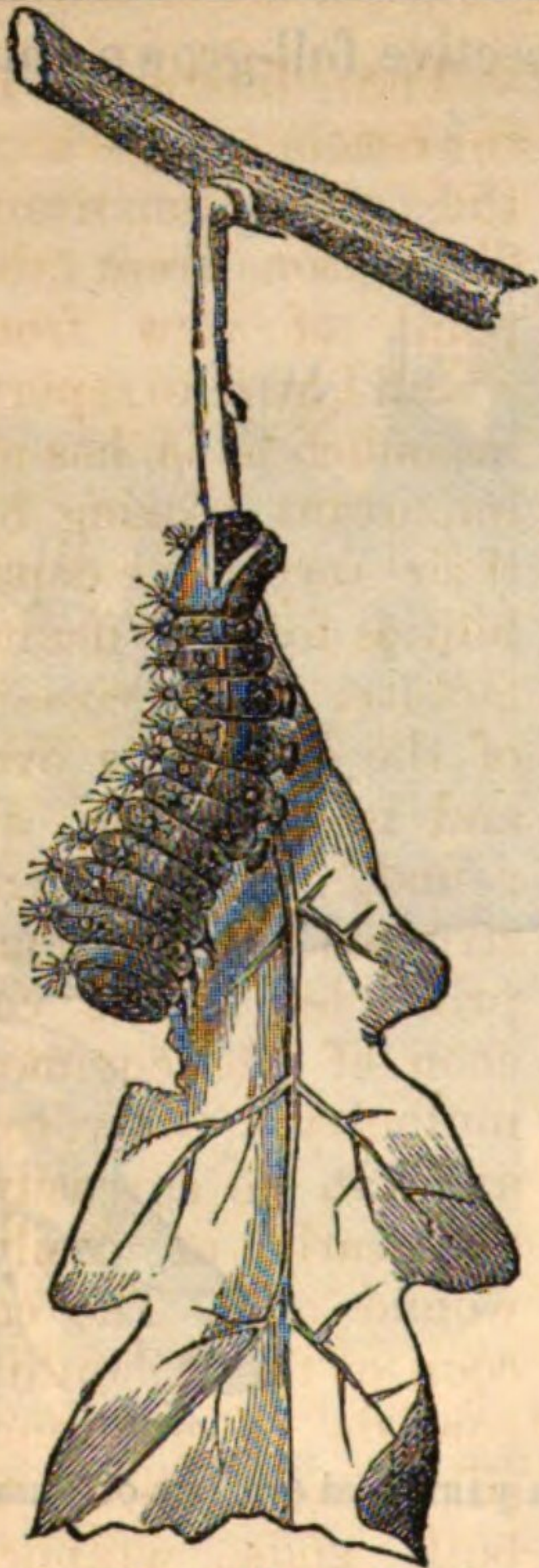


Fig. 7.—Caterpillar of *Antheraea yama-mai*, in its third stage.



Fig. 8.—Cocoon of Tusseh moth.

Figs. 8, 9, and 12 represent the differences between the cocoons of the Tusseh moth proper, its variety yama-mai, and the *Ailanthus* moth.

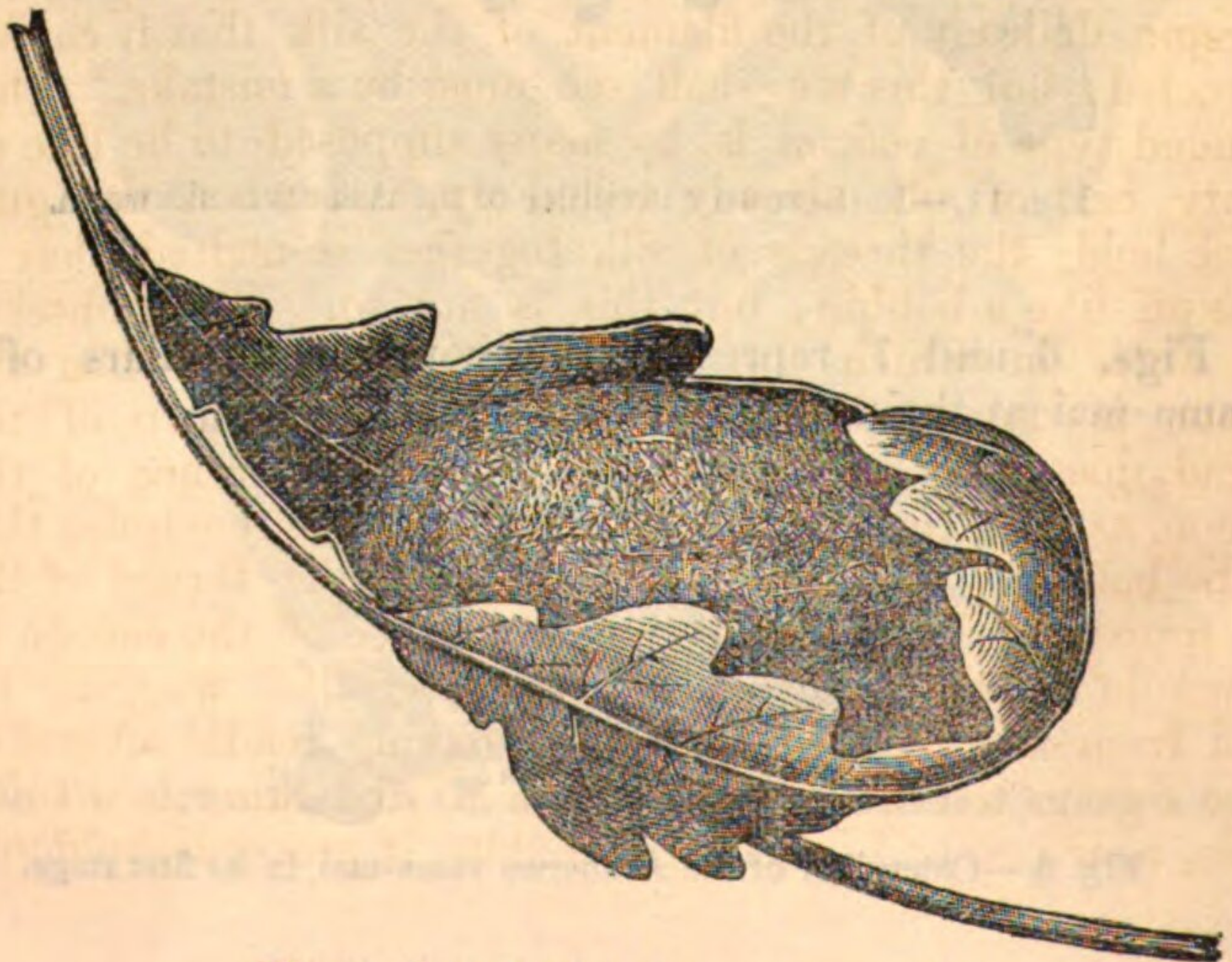


Fig. 9.—Cocoon of *Antheraea yama-mai*.



Fig. 12.—Cocoon of the Ailanthus moth.

up in an additional silk covering, which is open in front like a cloak or great coat. There is no reason why this should not be capable of being unwound or reeled off as well as the rounded and entirely closed cocoon of the Tusseh. It has, indeed, been said, that it is owing to the extreme delicacy of the filament of the silk that it cannot be reeled; but this we shall see must be a mistake. That rounded type of cocoon is by many supposed to be like an empty ball of silk already rolled up, and when the gum which holds the threads of silk together is melted that it reels off like a bobbin; but this is not so. If we observe the order in which the thread detaches itself when the cocoon is unwound, we shall see that each turn of the thread does not encircle the entire circumference of the cocoon, as each turn of the thread of a bobbin encircles that of the bobbin; but that, on the contrary, the thread of the silk forms a series of zigzags on the surface of the cocoon as shown in fig. 13, produced by the caterpillar wagging its head from side to side; that, after having made several of these zigzags tolerably close the one to the other in a small space, near one end or near the middle, it proceeds suddenly

The difference in the cocoons is perhaps the most important distinction from the point of view from which I have to report, inasmuch as it has an important bearing on their respective capabilities for silk manufacture. The cocoon of the Tusseh is oval and is closed in all round, being constructed on the same principles as the cocoon of the common mulberry silkworm, and can be as easily, or nearly as easily, wound off. The cocoon of the Ailanthus consists of an inner silk case open at both ends, wrapped

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

Character of
the cocoons.

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

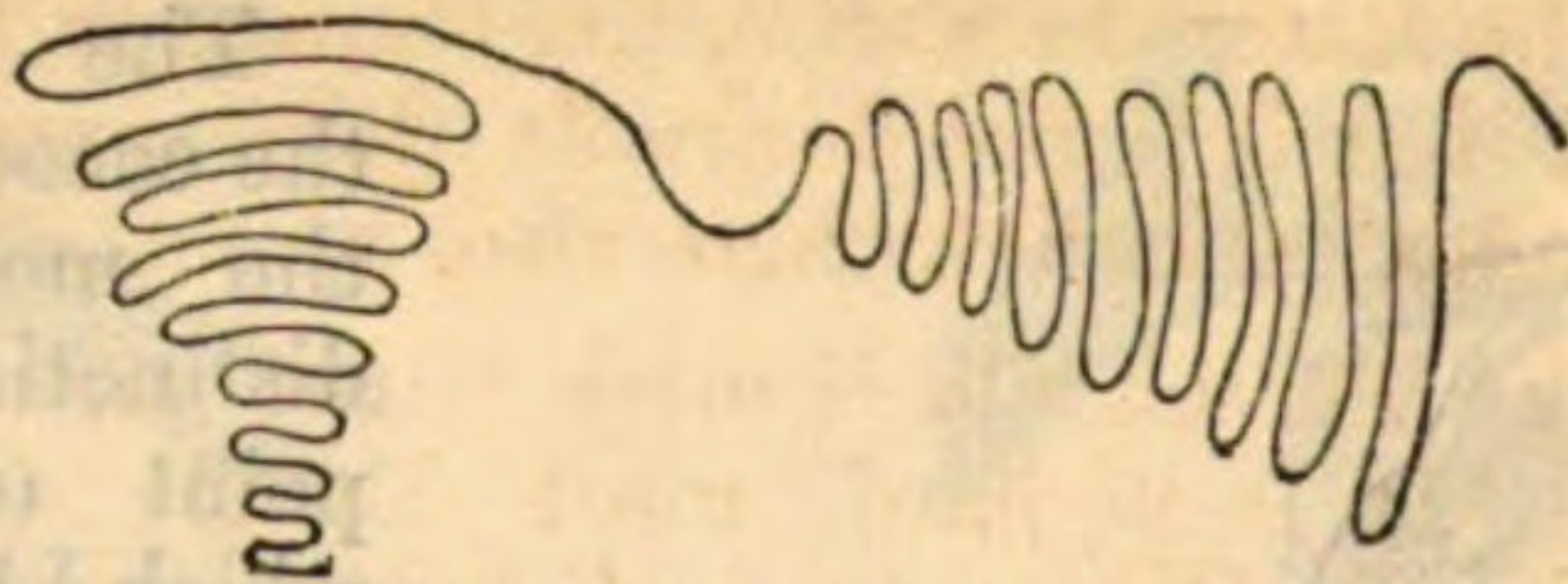


Fig. 13.—Mode in which the silk thread of the cocoon is disposed.

to make others at some little distance off, and sometimes at the other end altogether, the insect, when these changes were made, having obviously shifted its place. It uses these zigzags to strengthen first one place and then another, seeming to be guided by no rule, until the outside of the cocoon is completely covered in; and then it has only to fill up and fortify the interior in the same way to the proper thickness.

Difficulty of
reeling off
the cocoons.

No doubt the placement of the thread in the *open cocoons* will in many respects be very similar; but at the open ends it is turned backwards on itself and laid side by side along the immediately preceding part of the thread, to which it is glued so as to make it appear like one fibre. It must obviously, therefore, be much more difficult to reel the thread off these cocoons; but, within the last two or three years, the difficulty has been conquered by the Countess of Corneillan and by Dr. Forgemol, at Tournau, who have reeled off the silk to the length of 800 yards (the normal length of the mulberry silkworm thread is about 300) in one unbroken thread.

Still, the success is short of what is required for practical purposes. The process of reeling off the cocoons of the common silkworm consists of placing five or six of them in a basin of hot water, and, finding the end of the thread of each, uniting them and winding off the whole five or six into one thread, giving it a particular turn, which is essential. Whether it may be possible to reel off so many at once and give the necessary twist with such irregular cocoons as the open ones of the *Ailanthus* worm is doubtful—at any rate, I believe it has not yet been done.

Tusseh
moth bred
in India.

The “Tusseh moth” proper has not yet been introduced, nor is it likely to be so; it requires a hotter climate than any in Europe, and there is no inducement to go to trouble in regard to it, seeing that its silk is already an article of commerce in India, and if we want it we can get as much as we like in the same way that we get the silk of the common silkworm from Bengal. It is cultivated by a species of semi-domestication; but the Mantchourian and Japanese varieties

are wild. The latter do well in the climate of France in the open air, and if it is found desirable there seems no obstacle to their semi-domestication there also.

In India the Tusseh silk is used either mixed with cotton or unmixed. It is a hard, most durable silk of a dark brownish colour. When used without mixture it is woven into a kind of cloth called Tusseh-doolhies, which is much worn by Brahmins and other sects of Hindoos. In this state the natives call it Korah. The Europeans settled in India employ it for summer cloths or to cover furniture. It is perfectly fitted for this use, because the stuff, in consequence of its firmness and brilliancy, looks always clean. Nevertheless, this silk, strong though it be, cannot resist very frequent washing, and ends by being cut when it has been subjected to the violent proceedings of the Indian washermen. When the Tusseh silk has been freed from gum and mixed with a little cotton, it is manufactured into more pliable tissues in designs of all forms and different colours. In this state it is extensively used both by the Indians and Europeans.

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

Tusseh silk.
Its quality.

The Ailanthus or Arrindy moth extends over nearly the same ground as the Tusseh; but, as already said of it, we have only two varieties, the one Indo-Chinese and the other Japanese. The former is reared in a domestic state over a great part of Hindostan, but more especially in the districts of Dinajpur and Rangpur, in houses, and feeds on the leaves of the *Ricinus communis*, or castor-oil plant, an annual in Europe, a tree in Africa and India, conspicuous for its broad palmate leaves, which have given it the name of *Palma christi*. From the causes I have above explained, the silk of this species has hitherto never been wound off by the natives, but they were obliged to card and spin it like cotton. Dr. Helfer (*Journal Asiatic Soc. Bengal* (1837), p. 45) says that it is so productive as sometimes to give twelve broods of spun silk in the year. The Japanese Ailanthus, on the other hand, only has two broods in the year.

Ailanthus
moth bred
in China
and Japan.

The cocoons of the Arrindy moth are soft and white, or yellowish. After the cocoon is carded and spun, like cotton, the yarn thus manufactured is woven into a coarse kind of white cloth, of a seemingly loose texture, but of incredible durability, the life of one person being seldom sufficient to wear out a garment of it.

Ailanthus
silk.

The Japanese Ailanthus worm is reared by the natives in Japan in a semi-domestic state, and its silk is said to be largely made use of there, although it does not appear that

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

Introduc-
tion of the
Ailanthus
and Tusseh
silkworms
into France,
&c.

it is used for anything but coarse stuff. It feeds on the *Ailanthus glandulosa*, a Japanese tree, which is now almost as common in France and England as in its native country.

Seeing that the *Ailanthus* moth and two of the Tusseh moths (the *A. pernyi* and *A. yama-mai*) come from districts as temperate as that of France, and that all three feed upon plants which grow in the open air in France, no fitter subjects for what the French call acclimatisation could have been selected.

The possibility of rearing them in the open air has been fully proved by hundreds of experiments, and, in fact, the results of these open-air educations has been to naturalize at least one of the species (the *Ailanthus* moth), several instances being already recorded of this moth or its caterpillar having been found in gardens or places (chiefly in or near Paris) where no *Ailanthus* moths had been bred.

Open air
cultivation.

The advantages of this open-air cultivation are not few. It reduces the management of the education to the preliminary attention to *graines* and the coming out of the young worms, the placing them on the trees, the guarding them from birds (for which a watch is necessary, it need not be an expensive one,—a woman or a boy will suffice, and it is only for a month), and, finally, the collection of the cocoons. After the trees have been once sown with these silkworms, the cultivator has nothing to do but to leave them to browse for about a month, when he will find his harvest hanging to the leaves. It is undeniable that there is a great contrast between the simplicity of this procedure and the buildings, the heating, the numerous workmen required to collect and carry the leaves of the mulberry-tree to the magnanerie, to feed the worms four or five times a day, to clean the shelves and clear away the litter, and to provide and place the branches or heather stalks on which the worms may spin their cocoons. Another advantage dwelt on by M. Guérin-Meneville is that the *Ailanthus glandulosa* grows well on barren ground, so that the trees required to furnish the food need cost little or nothing for rent (always supposing there to be bad ground on the spot).

There is no comparison between the advantages of each thus contrasted, but it is still to be found out whether the harvest of the *Ailanthus* cocoon, when the experiment is tried on an industrial scale, will be equally or even fairly abundant; and, assuming it to be all that could be wished in that respect, the more important vital point still remains—*whether the silk of these new worms is worth introducing at all.*

Question
whether the
Tusseh and
Ailanthus
silk is worth
introducing.

So far as regards the quality of the silk, both of all the Tusseh and Ailanthus worms, we know that it is coarse, ill-coloured, and cannot be placed in competition with the most inferior of mulberry silk. At first, the silk of each, as it was successively brought into notice, was vaunted as being of first-rate quality—as good as mulberry silk in some respects and superior in others. But this high tone has long since been lowered. Dr. Royle, in his “Report on the Resources of India, as exhibited at the Exhibition of 1855,” mentions that one French manufacturer had commenced making “some plushlike material,” of different colours, of the Tusseh silk. But the mission of silk is not to produce plush; and if that is all that the yama-mai can do, it clearly can never be used as a substitute for mulberry silk. Dr. Royle further, in his “Productive Resources of India,” mentions that the Tusseh silk is a coarse, durable silk, which is much esteemed in India both for ladies and children’s dresses; for the latter especially, on account of its cheapness and durability. “This silk,” said he, “will probably become an extensive article of commerce, as some of it, having been sent on speculation to Paris in its unbleached state, was there employed as a covering for parasols, and was found to answer so well that an instantaneous demand for it sprung up.” The price advanced, and the quantity imported increased. In 1835 only 158 pieces; in 1836, 830; in 1837, 2,647; and in 1838, no less than 4,249 were imported. This is a fact by no means in its favour; for, notwithstanding this start, it has made no way, and is not now in the market, so we may assume that on trial it has not been found to answer.

M. Guerin-Meneville, in his later notices of the Ailanthus silk, seems to have arrived at a more correct appreciation of its nature and value. “As to the textile matter,” says he, “if we can get it thus at a very low price, it will hold a middle place between silk and wool, under the name of Ailantine, and appears destined to become in France what it has been from all time in China,—the silk of the people” (Rev. and Mag. Zool., 1859, p. 335). M. Guerin-Meneville forgets here, however, the difference between the climate of China and that of France, and that while in the one a light silken vestment is the most pleasant clothing, a good woollen coat will be preferred in the other.

When we recollect, too, what the price of cotton was and is (6d. to 2s. a lb.), doubts will arise as to the possibility of producing any silk at such a price.

Still, silk is always silk, however inferior, and uses will doubtless be found for it if it is once brought into the market in industrial quantities. This it has never yet been; all these silks

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

are wholly unknown in the silk market, and this I regard as the most unfavourable symptom of the whole. If the Tusseh were really good, it would have been imported long since, like the silkworm cocoons from Bengal; and of the others, even the home growth in France should ere now have made some sign. Experiments with the avowed purpose of introducing it have been going on for the last fifteen years, many of them by practical men desirous of making money out of it; and it is still unknown in the market. The question will soon be settled by the experiment now in progress of a regular *Ailanthus* silk-farm, which has been sanctioned by the Emperor, and is being conducted by M. Guerin-Meneville. But had the silk been really capable of being put to profitable use, I cannot help thinking that some of the many keen men of business in the silk industry who have tried it would have made something of it ere now.

Bee hives.

I should have wished to report on the many contrivances exhibited for housing bees and spoiling them of their honey, but none of the inventions of any importance can claim notice on the score of novelty; apiarians have for so long gone on improving the apparatus for rearing bees, that at last they have left themselves no new worlds to conquer. Any novelties in the apparatus consist merely of slight modifications of discoveries made and exhibited at the Exhibitions of 1855 and 1862. The most remarkable are the bars and frames contrived by Mr. Woodbury some years since, consisting of something like a liliputian empty window-frame, a series of which are hung up in or fitted into the hives, and the bees, by means of impressed guide-sheets of wax, are led to fill up the vacant space with comb and honey. The frames can be removed and plundered, or placed in other hives, or shifted about at pleasure. The impressed guide-sheets of wax are the production of a German inventor, and were exhibited in the Austrian department of the Exhibition of 1862. They have since been purchased and utilised by Messrs. Neighbour and Son. They are especially adapted for these frames, and are, in fact, the foundation on which the bees are invited to form the comb.

Bars and
frames.

REPORT ON VEGETABLES —(Class 85.)—BY ROBERT
HOGG, LL.D., F.L.S.

DR. HOGG
ON VEGE-
TABLES.

THE only vegetables that are exhibited in a fresh state Potatoes. are a numerous collection of potatoes, consisting of no less than 158 sorts, in the Prussian department, and a number of esculent roots in the Algerian department. The latter will, perhaps, prove the more interesting to the visitor, as furnishing excellent examples of some of the esculent roots of tropical and sub-tropical regions, which are not frequently to be met with. Among these are large rhizomes of *Colocasia odora*, *C. antiquorum*, *C. violacea*, *C. sagittifolia*, and *C. esculenta*. Of these, the last is the one most extensively used. It is known by the names of Egyptian ginger, cocoa-root, eddoes, and yams; but the last name is more properly applied to a very different root. The rhizomes or large fleshy roots of this plant abound in starch, and form an important article of food to the inhabitants of the countries where they are grown. A peculiarity of the flowers is that they have such a cadaverous smell that flies deposit their eggs in them as they would in a dead carcass. Several roots of *Canna edulis* and *Canna discolor* are also exhibited, the roots of which are used as food, and numerous varieties of *Dioscorea alata*, a species of yam, which appears to assume every form of round, long, and palmate in the shape of its tubers. There are also many varieties of the tubers of *Batatas* or sweet potato—the potato of Shakespeare, which was largely imported every year from Spain and Portugal, under the name of “Spanish potatoes,” during the sixteenth century. They are extensively grown in the south of Europe, but are too tender for outdoor cultivation in Great Britain.

Of dry farinaceous vegetables there are some very extensive collections in the Portuguese, the Italian, and the Russian departments. In the Portuguese will be found a large collection of many varieties of haricots, which, unfortunately, are not distinguished by any special names, thereby precluding the possibility of making allusion to any of them individually. Here may also be seen many samples of “Gesse,” or, as it is called in England, chickling vetch. It is the *Lathyrus sativus* of botanists, and flour made of its seed is used in Italy, Spain, and Portugal for making bread; but so remarkable an effect does it produce on the animal

Dry farina-
ceous vege-
tables.

DR. HOGG
ON VEGE-
TABLES.

system that it is necessary to mix it in half the quantity with wheat or other flour. If used alone for any length of time it produces extreme rigidity of the limbs, and swine fed upon it entirely lose the use of these members and become exceedingly fat, lying on the ground. In all the departments already named will be found numerous examples of the ram's-head or chick pea. It will be found marked "Pois Chiche." It has been called by botanists *Cicer arietinum*, from the great similarity the seed bears to a ram's head; and its English name of chick pea is in allusion to a fancied resemblance it has to a young bird coiled up in the shell. The seed is used in the south of Europe in the same way as we do garden peas, in soups and other dishes; and about Naples the children and common people eat them raw when they are yet tender. By the Spaniards, who call them "carvancos" or "garavanzos," and the Neapolitans, who call them "cece caliato," they are roasted, ground, and formed into an agreeable infusion resembling coffee. A remarkable peculiarity of the plant is that during the excessive heat of summer the leaves and stems sparkle with minute drops of an extremely acid, thin, viscous liquid, which has been found to be oxalic acid in a state of purity.

In the Italian collection of haricots there is one that might be introduced with advantage into English gardens; it is called *Fagioli del Giappone*, and has been cultivated successfully by the Acclimatisation Society of Paris. It is a small round seed of the shape and colour of a green pea, and its colour would doubtless prove a high recommendation.

Preserved
vegetables.

In most of the departments preserved vegetables may be found, but particularly in Holland and Russia. The Dutch are remarkable for the brilliancy of their colour and their fine condition. They consist of carrots, peas, cauliflower, red cabbage, Brussels sprouts, cabbage, chick peas, and turnip-rooted celery. Besides these, in the Russian department there is a large collection of preserved mushrooms.

REPORT on FRUIT TREES.—(Class 86.)—By the Rev. T.
C. BRÉHAUT.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

THE section of the reserved garden appropriated for the exhibition of trained fruit trees is adjacent to the Ecole Militaire, and runs parallel with it. To reach this section either the whole building must be traversed or a distinct entrance is found at the Porte de Tourville.

A portion of the trained forms is also exhibited at Billancourt, the chief interest being in the garden itself.

As it was impossible to allot sufficient space to the large specimens which best represent this branch of horticulture, or, indeed, to transport any such, the trees in general are too young accurately to illustrate each particular system.

From want, also, of root space, and being necessarily crowded, together with their recent change of situation, a crop of fruit is wanting during the season. Bearing this in mind, there is much which will please the intelligent observer in this section, and an occasion like the present will not readily recur.

Horticulture of late years has made rapid progress, not only in our own country, but also on the continent. While, however, England has utilised the resources of her mechanical skill in producing unrivalled glazed structures for the ripening of exotic fruits, and, especially, by the introduction of orchard houses, has popularized a taste for fruit culture in hitherto unapproachable respects, the continent has remained comparatively indifferent in these matters. It is only, therefore, in the exhibition of trained trees adapted for the open air that the English visitor, and especially the amateur class, now so large, has anything to learn from abroad. But here the French and Belgian horticulturists have always held a high position, and still merit it. Possessing, as they do, climates and soils differing widely from our own, but extending over so comprehensive a range in themselves as to meet ours in various ways, it must prove instructive to remark what general principles are in present estimation among them, and to record wherein these principles have progressed.

In considering this, we must not forget that the general subdivision of property in France and Belgium has created

Small proprietors.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

a numerous race of small proprietors, warmly attached to their lands, and eager to secure a good return from them. Such a class becomes an accurate discerner between true and false theories, and is apt to be somewhat slow and impatient of innovation. There are few or no large landed proprietors, as with us, who embark largely in horticultural pursuits of an expensive nature, nor is fruit culture much directed by such as these. But there exist a wide-spread intelligence and a keen sense of what is profitable and useful among the numerous small possessors of land, cultivated by them as a garden of necessity. It is satisfactory then to find that amongst this class also the principles which rule over modern fruit culture have made good progress, and also that the specimens exhibited show a recognition of these principles.

No visitor can fail to remark the general coincidence of taste for regular symmetry of form joined to accuracy of detail. Not a single object can be pointed out which is at variance with this theory. There is literally nothing resembling the irregular and ill-balanced forms so common in England in this section, for which the changeableness of our climate is alleged as an excuse. But even the opponents of regularity of form abroad (and there are some) declare that this regular method of training best suits our English climate. The amateur, and especially the orchard house proprietor, will note with satisfaction many new and admirable specimens perfectly adapted to economise his valuable glass or wall space. Some of these he could hardly expect to find even depicted in horticultural works, so novel are they. Others, though not unknown, have hardly as yet met the attention they deserve.

It will also be evident how much modern ideas respecting fruit culture have been modified of late years. Many more trees, of forms corresponding to the change, are now planted than formerly. A long season, and a succession, comprising new and valuable varieties, are now required by modern taste. The advantages of such a practice are evident, and comprise some of the chief requirements of good culture.

It is instructive and satisfactory to find that the same conclusions have been arrived at in other countries through the same amount of antagonism. And when we discover that this result has been brought about by a class of practical and intelligent men of no great means, we are the more convinced of its soundness.

Schools of
continental
fruitculture.

There exist, of course, various schools representing phases of continental culture, which, in noticing the objects exhibited, we can assign and distinguish. The oldest form of

these is the Montreuil school, well known, by name at least, in this country. It still flourishes on the continent (in France and Belgium principally), and shows the best style of modern long pruning. It is accurate in detail, eschews all irregularity, is generally good in developed forms, and has some ancient shapes as yet unsurpassed for low walls. One first prize is given to forms shown by M. Chevalier (Ainé), and a second is allotted to M. Gillechens (of Belgium) for trees trained in this style. In our opinion these last will be preferred by English visitors at least. M. Chevalier's trees comprise a 30 feet long "palmette" with horizontal branches, the "coursonnes" of which, "à la Montreuil," are perfect, and recommended to the admirers of long pruning. But even these will join us in agreeing that the intervals between the branches show the inherent defects of this system, being too wide. With closer pruning the crop could easily have been increased by one-third. Another tree, by the same cultivator, is a waved "palmette" with double central leaders, both are wall trees. M. Gillechens shows several fine peach trees (also in the Montreuil style), in which the double central leader is adopted. This plan controls the main sap, aids in constituting the lowest branches, and is one of the very best hints furnished in this section. It is much adopted abroad at present, and recurs frequently here and at Billancourt.

Figures 2, 5, 6.

The trees which illustrate another distinct school of much repute abroad, that of Professor Dubreuil, are the oblique or diagonal cordons, chiefly of pear and apple trees. These are nearly all very closely stopped in their shoots; but an interesting specimen of M. Dubreuil's early style is exhibited by M. Gillechens, consisting of a vertical peach cordon, having the side shoots of 12 in. or 15 in. in length. Though close pruning has superseded this fashion it might still be well adapted for peach trees on the open wall in some localities. At any rate, it is new to most visitors.

There are good diagonal (pear and apple) cordons in this section, and also some, by Professor Gressent (a leading name), at Billancourt. These diagonal cordons have been so long recommended by the writer, from his own experience, as very suitable for our climate and wants, that it is hoped a visit to these trees may remove some doubts. In a few years, when better known, they will be universal favourites in England.

In front of these diagonal cordons, here and at Billancourt, will be seen those low lateral apple cordons, trained

Figure 1.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

on wires, and bearing, on closely stopped shoots, the second season; which, for edgings of borders, will soon become common everywhere. Other crossed cordons of apples may be seen here worthy of notice.

The newest and most modern school, founded by Mr. Grin, of Chartres, is, unfortunately, not represented here, save by imitators. Its influence on modern ideas is, however, visible enough in the minute attention paid to the close summer stopping of the shoots in the growing season, which leaves little to be retrenched at the winter regulation. Formerly, the reverse of this was the rule. It is therefore to be regretted that no specimen of M. Grin's own work is here shown. His extremely close style—bisecting the stipulary leaves—can best be judged by inspecting the trees themselves. Without committing themselves to this very close method, M. Grin's adherents have obtained excellent results.

With modifications rendered necessary by the exigencies of our humid climate, the principles involved in this system are well calculated to succeed, and will eventually (as they have already done in the case of orchard house trees) supersede the older fashions of long pruning.

Figures 2, 5,
6.

Among the wall trees exhibited are excellent double "palmettes," either with the branches trained horizontally, diagonally, or arched downwards. The last fashion, for low walls, in humid localities, is excellent. A "palmette," with double central leaders, and extremities of the branches turned upwards "à la Verrier," is perfect. It is a pear-tree, but this style would suit any variety but the cherry. Specimens of forms with single main leaders are common. The finest is a large peach "palmette à la Verrier." Messrs. Janin and Durand have prizes for apricot and plum trees, and for pyramids. The last present excellent forms, which are well adapted to resist the violence of storms. A four-winged pear standard, the extremities of the branches turned sharply upward, and attached to the nearest above, is very beautiful. So is a large standard pear at Billancourt, in the centre of what is called the Emperor's garden, by Baltet (Troyes), which is admirably calculated to admit light and air, besides providing resistance against wind.

Figure 3.

Figure 4.

There are other trained forms which require no notice here. Those described are the most characteristic of modern ideas. They have all the leading points necessary for good fruit culture, such as regular symmetry of form, true balancing of either wing, and close attention to systematic summer stopping of the shoots. The visitor will not find

here the irregular fan which finds so much favour in England, and is surely so out of harmony even with the present taste for geometrical flower-beds, at least in small gardens, where unavoidably visible.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

Connected with this subject in some measure is the show of vines at Billancourt. But these are mainly vineyard forms, and should be studied under this idea. M. Charmeux, of Thomery, carries the prize for his system, which is in high repute in France. Some hints for ground vineries may be taken here from the arched vines, which are so prolific. These ground vineries have not been as yet much noticed on the Continent, though of obvious value. Neither are orchard-houses appreciated, though by their means the amateur can afford to look without regret on the best results of a splendid climate. His chief aim should be to utilise any hint afforded by beauty of detail, in which Continentals often excel, and which so well suits for his work.

Trusting to their climate, our neighbours have little faith in the need of such things as tiffany protectors or other appliances, now so well known in England, but not shown here. They are, however, recommended in their best authors, and are as much required in the northern districts (especially near the seaboard) as they are with us. It is to be regretted that none were shown by English houses, as well as some other matters connected with fruit culture. The results of international exhibitions are seen in some fair potted trees from Montpellier, and some ingenious portable shelters for these trees, not without interest and capable of development. In this respect the south of France has borrowed ideas of value from our cultivators which we should have expected the northern districts would first have appreciated.

On the whole, then, the English visitor may look with much interest on the trained forms exhibited, and note the general agreement of Continental opinion in the value of symmetrical disposition, joined to a much closer attention to detail than as yet obtains in our practice. The increasing conviction that better results can be obtained from the use of more glazed structures (wherein economy of space is a great object, than by following more ancient customs in days when these houses were not so obtainable, will cause any new form to be a valuable hint to follow. Had Continentals adopted such valuable appliances as ground vineries, and especially orchard-houses, the exhibition of this year would have shown far higher results.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.]

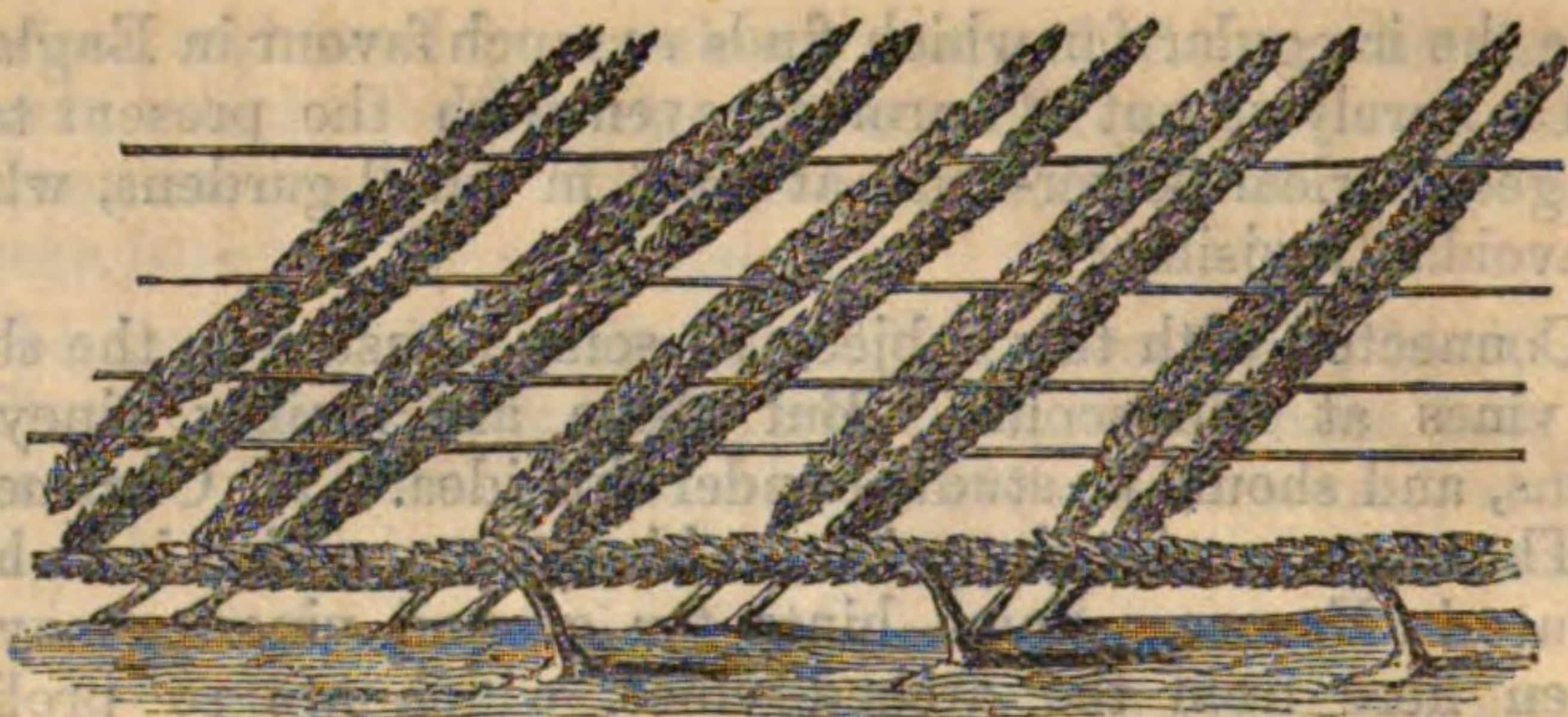


Fig. 1.—DOUBLE ROW OF DIAGONAL PEAR CORDONS.

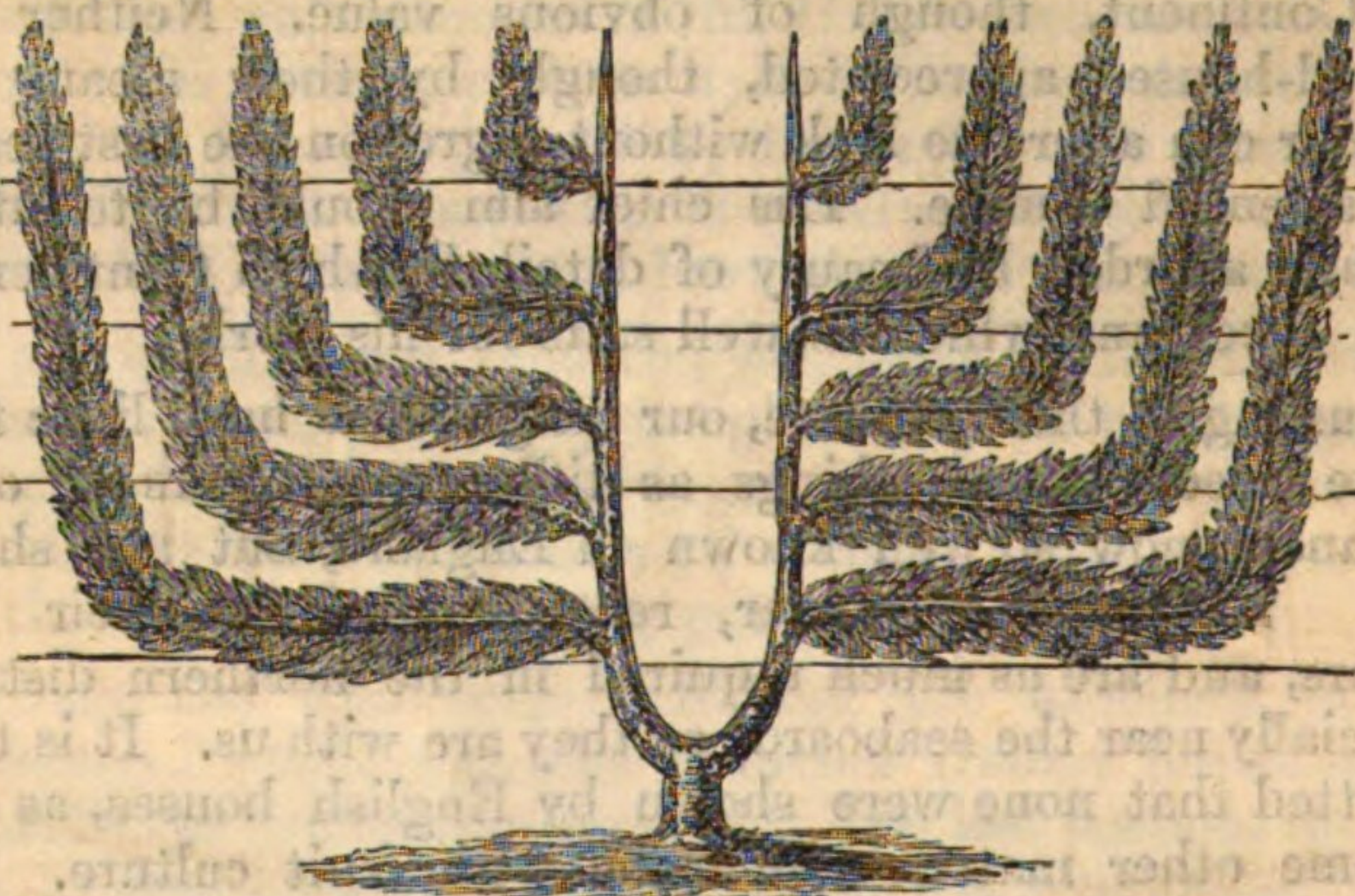


Fig. 2.—DOUBLE PALMETTE À LA VERRIER.

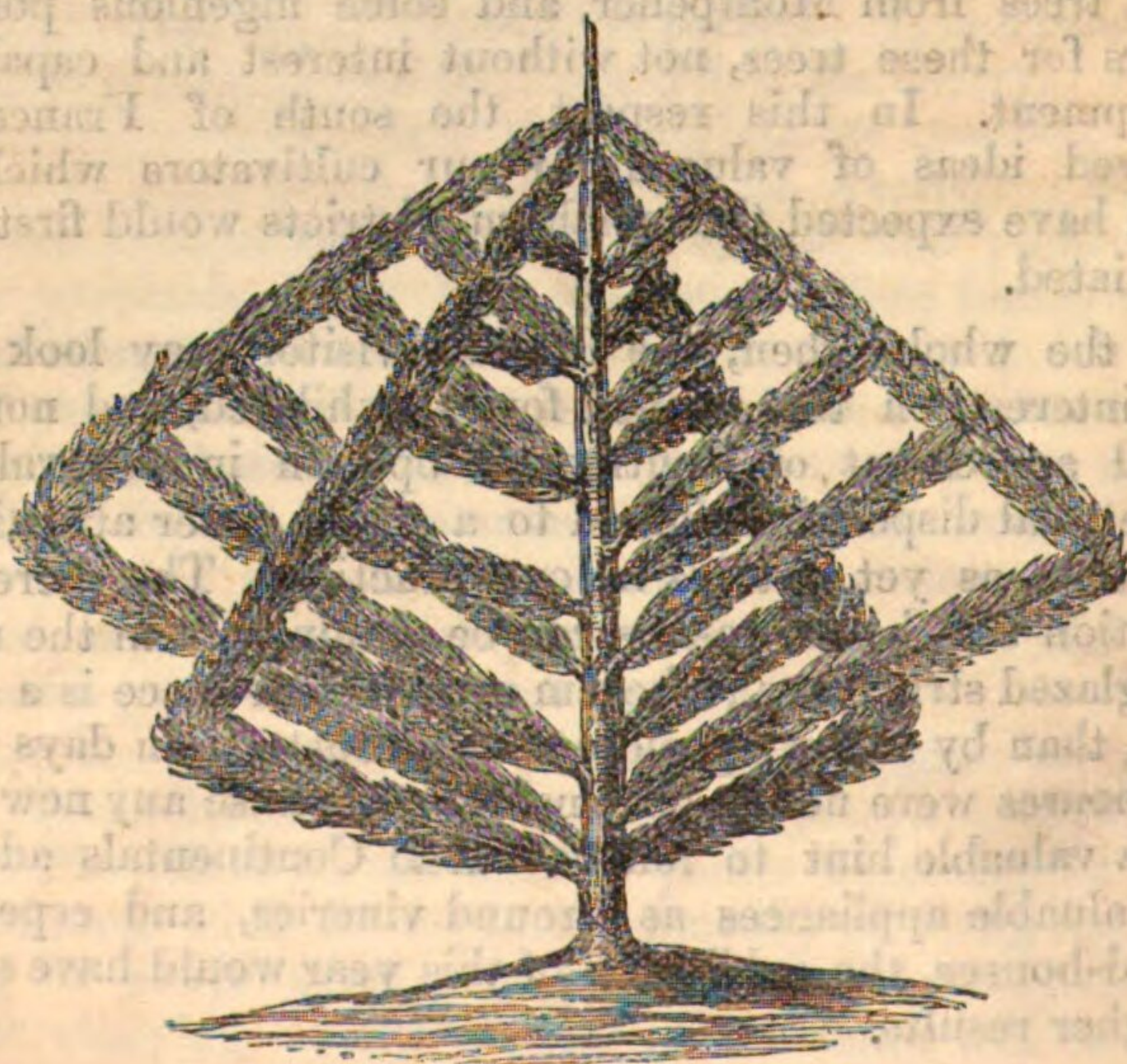


Fig. 3.—STANDARD PEAR TREE WITH FOUR WINGS.

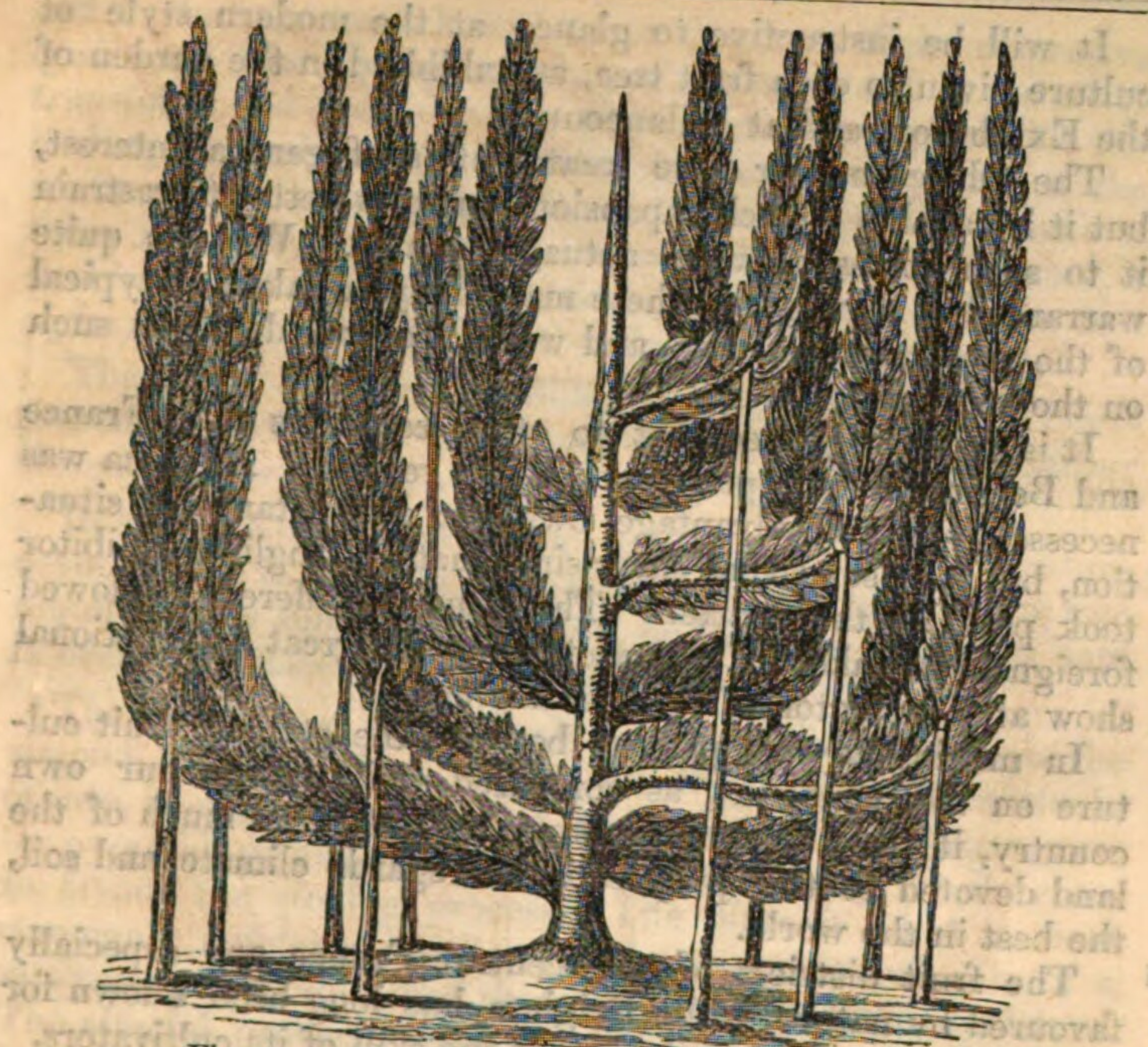


Fig. 4.—STANDARD PEAR TREE AT BILLANCOURT.

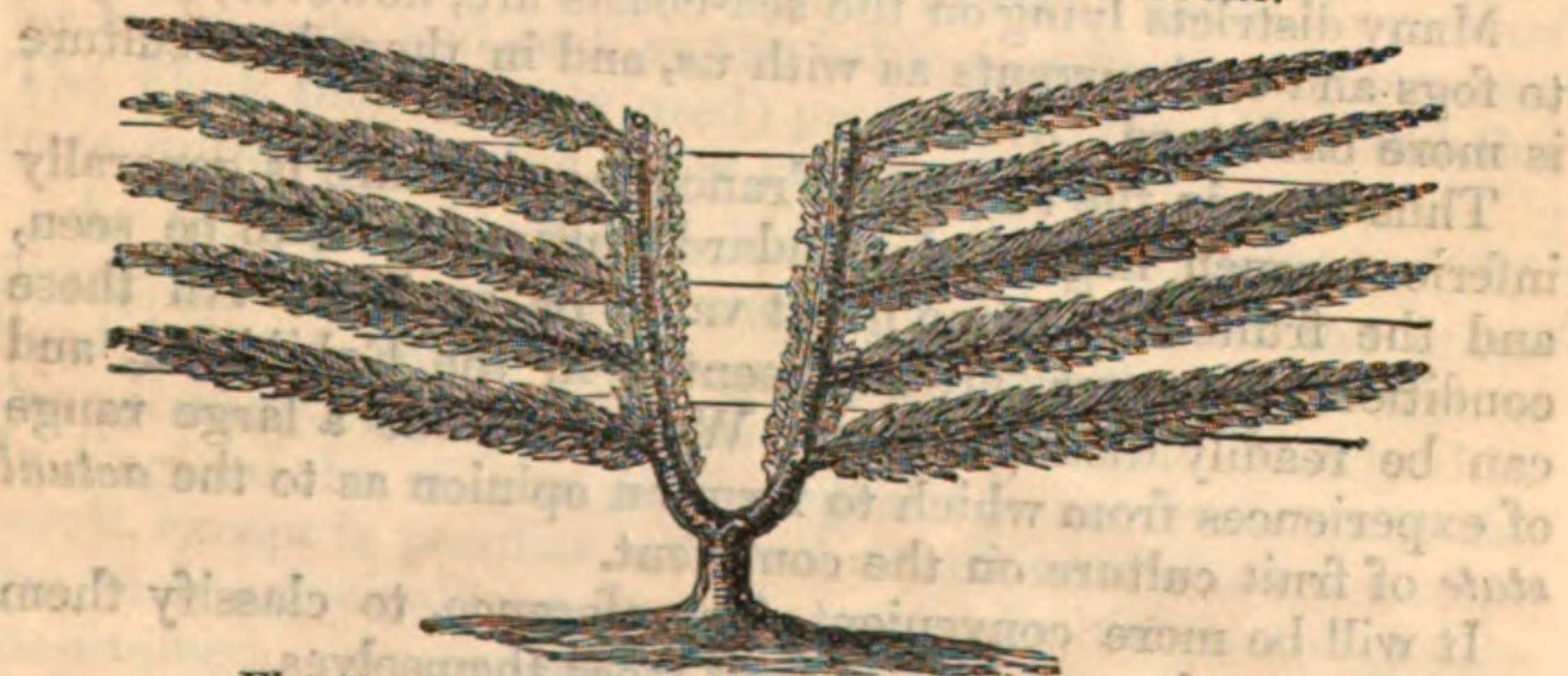


Fig. 5.—DOUBLE PALMETTE WITH OBLIQUE WINGS.

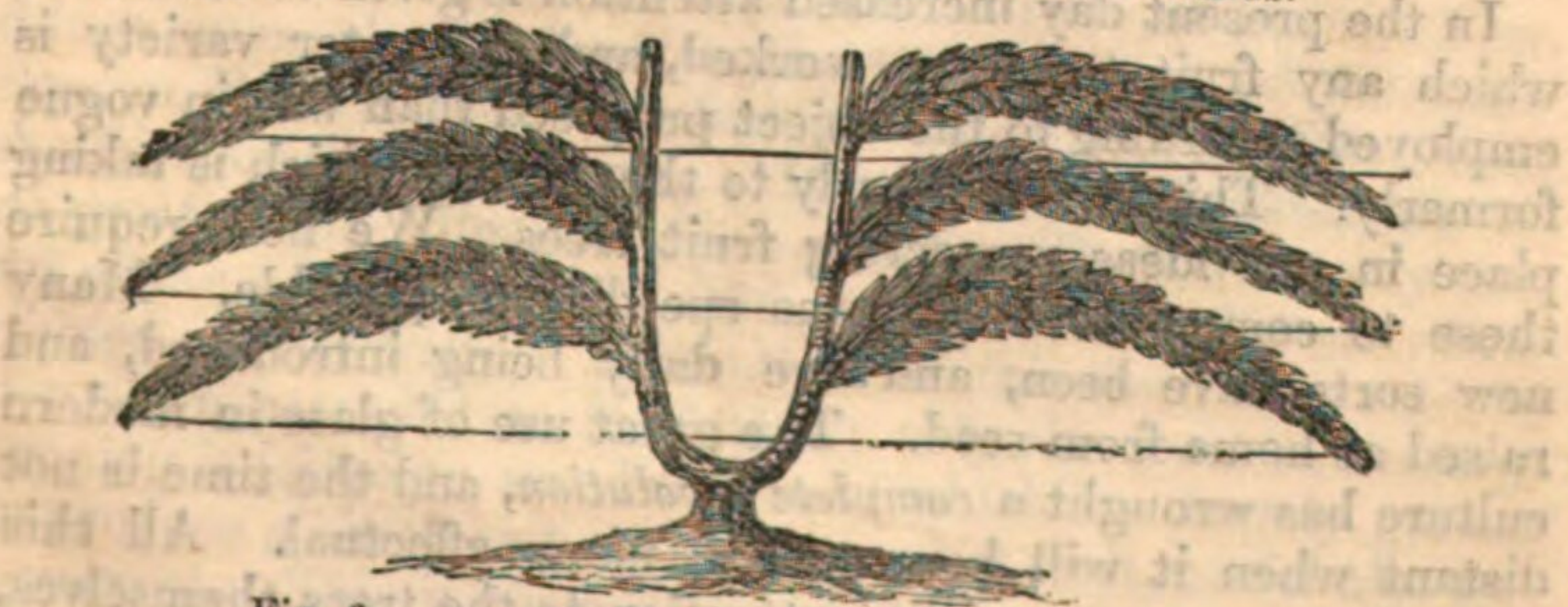


Fig. 6.—DOUBLE PALMETTE WITH ARCHED WINGS.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

It will be instructive to glance at the modern style of culture given to each fruit tree, as exhibited in the garden of the Exhibition, and at Billancourt.

The subject matter here treated of is of general interest, but it is capable of such expansion that it is better to restrain it to such forms as were actually shown. We are quite warranted in saying that these may fairly be taken as typical of the *most modern* ideas, and would be considered as such on the continent.

French and
Belgian
exhibitors.

It is to be regretted that no other countries than France and Belgium were represented in this section. America was necessarily at a disadvantage, owing to the distance of situation, but it is somewhat surprising that no English exhibitor took part in the matter. The same indifference allowed foreigners to take an easy victory at the great international show at Kensington of 1866 in this class.

English.

In making any comparison between the state of fruit culture on the continent, as compared with that in our own country, it must always be borne in mind that much of the land devoted to this purpose is, as regards climate and soil, the best in the world.

Mid-central
districts.

The fruit districts of mid-central France are especially favoured by nature, while Belgium has long been known for the excellence of its produce, and the skill of its cultivators.

Sea-coast.

Many districts lying on the sea-coasts are, however, subject to fogs and cold currents as with us, and in these horticulture is more backward.

South
districts.

Thus also, in the south of France, horticulture is generally inferior; much neglected standard cultivation is to be seen, and the fruits are of no great value or quality. All these conditions, however, are represented in the Exhibition, and can be readily distinguished. We have thus a large range of experiences from which to form an opinion as to the *actual state* of fruit culture on the continent.

It will be more convenient, for reference, to classify them according to the varieties of fruit trees themselves.

Fruit cul-
ture in a
state of
transition.

In the present day increased attention is given to stocks on which any fruit trees are worked, and a greater variety is employed according to the object proposed than was in vogue formerly. This is due greatly to the change which is taking place in our ideas respecting fruit trees. We now require these to come into bearing as speedily as possible. Many new sorts have been, and are daily being introduced, and raised at home from seed. The great use of glass in modern culture has wrought a *complete revolution*, and the time is not distant when it will become still more effectual. All this necessitates a corresponding attention to the trees themselves,

Use of glazed
structures.

and a studious care how best to develop their respective qualities. The style of training of trees is itself in a *state of transition*, and considerable discussion takes place in the leading horticultural publications in this country and on the continent at the present time, as to the respective merits of these *new systems*. For this reason alone, if for no other, a study of what foreigners consider as the *newest* and the *best styles* must be of interest to the English visitor.

There was exhibited at Billancourt an interesting collection of stocks for fruit trees, some of which are more in favour abroad than with us, and others the contrary.

In the case of the apricot, for example, the style of culture devoted to it is different from what it is with us, for this tree requires more sun than we enjoy, and is best cultivated here in orchard-houses where it is excellent.

Apricot
culture.

The stocks most in favour abroad are the free, the plum, the almond, and the black thorn. In Belgium, the free stock, of late, is much in vogue. It forms trees of moderate vigour for pyramids or half-standards, and is thought by the Belgians to favour the stoning process. The plum is what is most commonly employed, as it suits the generality of soils of a moderate consistency, and those exempt from undue moisture. The almond produces trees of large dimensions (such as are in favour in the southern districts of France), and it is precious for rocky soils, and such as are liable to suffer in dry seasons. The black thorn (rarely used) produces feeble trees, and the trees worked on it give a few but fine fruits.

As the apricot is apt to languish at the extremities (differing in this from most other fruit trees) it, on the other hand, is apt to throw out gross shoots from the base. Hence the necessity of adapting the style of training to remedy this. In England the culture of the apricot is uncertain as to the result, except in peculiar soils and situations. The trees often lose their principal branches, the cause of which is not clearly ascertained. According to Dubreuil, the apricot, as a standard, does not succeed north of the latitude of Paris. Few things more clearly show us the extreme heat of the sun's rays in France than the fact that standard apricot trees should flourish so far north. It is true the varieties are of no great value. Peaches ripen also near Paris with only the aid of the sun till 10 a.m. The apricot loses its flavour when trained against walls. The culture of this fruit, as a rule, is not much attended to in France; only the *most elementary* pruning is given to standard trees, which are largely grown to produce a cheap and abundant market fruit, useful also for preserves. This is much deprecated by writers on horticul-

Mode of
training.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

Apricots
"en cordon."

Figure 1.

tural subjects at present. Standards of the Breda succeed better than the peach apricot.

In private gardens the apricot is much trained "en cordon" diagonally. Straw mats, thickly plaited, are placed at the rear of each espalier, and are removed in May, when the dangerous spring frosts are past. Screens of tiffany or canvas are now recommended to preserve the blossoms in the spring. The value of such protections to all fruit trees is not yet *sufficiently* recognized abroad, or at home. Low horizontal cordons, such as are represented in Figure 1, are now advocated. They possess great advantages in ease of shelter from currents of cold air, and also from the radiation of heat from the earth (close to which they lie), and if planted at the feet of other trees (over whom a sheet is drawn for protection), this may be easily made to extend so as to include the horizontal cordons also. In some favoured situations in England this might be attempted, the cordons being at about 12 inches from the earth only, closely pruned, and trained on wires. At any rate such culture would be *quite new* to any English gardener, and if the apricots were alternated with plums, and these intergrafted, some novel results would follow.

Palmette
verrier.
Figure 2.

This is *one hint* afforded by an examination of the *best foreign* culture. Walls are not so common abroad as in England in gardens, for many obvious reasons, and when used are rarely so lofty as ours. These are devoted chiefly to the vine, either "à la Thomery," or somewhat wildly running along the upper portions of the walls. These walls are rarely devoted to apricots of course, but where so employed the palmette verrier is what is preferred as a form. This excellent form resembles Figure 2, but is superseded by the *better* and *newer* shape here represented, in which the *double central leader* enables the cultivator to regulate and divide the strength of the ascending sap. Figures 5 and 6 exemplify the popularity of this form of tree.

There are many varieties of apricots cultivated abroad, which are well known here in orchard houses.

Cherry
culture.

The stocks exhibited for the cherry were the well-known *Cerasus* Mahaleb (Prune de St. Lucie), and the common wild cherry. The Mahaleb is as popular in France as it is in this country. It suits unfavourable soils, and especially certain kinds (Morello and Duke) for bushes, an excellent mode of culture for this fruit. This stock is also employed for wall trees when of no great lateral development; such as are becoming more common. Some kinds of cherries (Bigarreau and Heart, or Guigne) succeed best on the common wild cherry stock. Root pruning of cherries, or indeed of

Root pru-
ning.

any other fruit tree, is not in favour on the continent, nor possibly would their dry evaporating soil require it as in England. Cherries are cultivated everywhere as large standards, very picturesque in the spring, as travellers know, for the market produce and other reasons. Many new varieties of this popular fruit have of late been raised abroad, and in America, and introduced into England.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

Some writers strongly advocate the cordon system for Training. cherry training in private gardens. Some varieties which do not naturally grow strongly are better adapted for this style. Professor Gressent is greatly prepossessed in favour of horizontal cordons, as in Figure 1, and these would be very valuable in many situations in English gardens, and, at any rate, quite novel. Trained at 12 inches from the earth, and grafted, each tree on the next to it, they would occupy but little space as edgings to borders.

Plums are largely grown as standards for market purposes and for preserves. But, unlike the apricot, the plum improves from a wall. Leading continental authorities, therefore, advocate a portion of wall space being devoted to them, as is the case with us. Pyramids are favourites in private gardens, and plum trees, "en cordon," diagonal and horizontal, both shown in Figure 1, are greatly recommended. An horizontal cordon of plum trees would be, no doubt, successful in English gardens, and has not, as yet, been even thought of. Varieties of feeble growth should be chosen, and the training is similar to the cherry in all respects.

Plum cul-
ture.

Training
"en cordon."

We come now to pears, which are the staple of French and Belgian gardens. No small proprietor but devotes the greatest share of his garden to the pear, and relies on it as his chief auxiliary. Continentals are essentially economical, and accordingly we find them setting a peculiar value on this fine fruit. Many varieties attest by their names their French and Belgian origin. Possibly the last are most in favour here, owing, partly to the greater similarity of climate, and partly to the skill of Belgian raisers. Of late years, however, much attention has been given by English nurserymen to the kinds best suited to our wants, and they may be trusted from their superior local knowledge. The experience of continental horticulturalists is identical with that of ours, and chiefly of such men as Mr. Thomas Rivers of Sawbridge-worth Nurseries, as to the value of the quince as a stock for the pear. It is mainly by Mr. Rivers that this change has been effected, being *another advance* from systems requiring generations to perfect them. Especially would such a change be beneficial in our English soil, where a surface rooting stock is of the *greatest* value. The free stock forms

Pear cul-
ture.

Varieties in
favour.

Pear stocks.

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

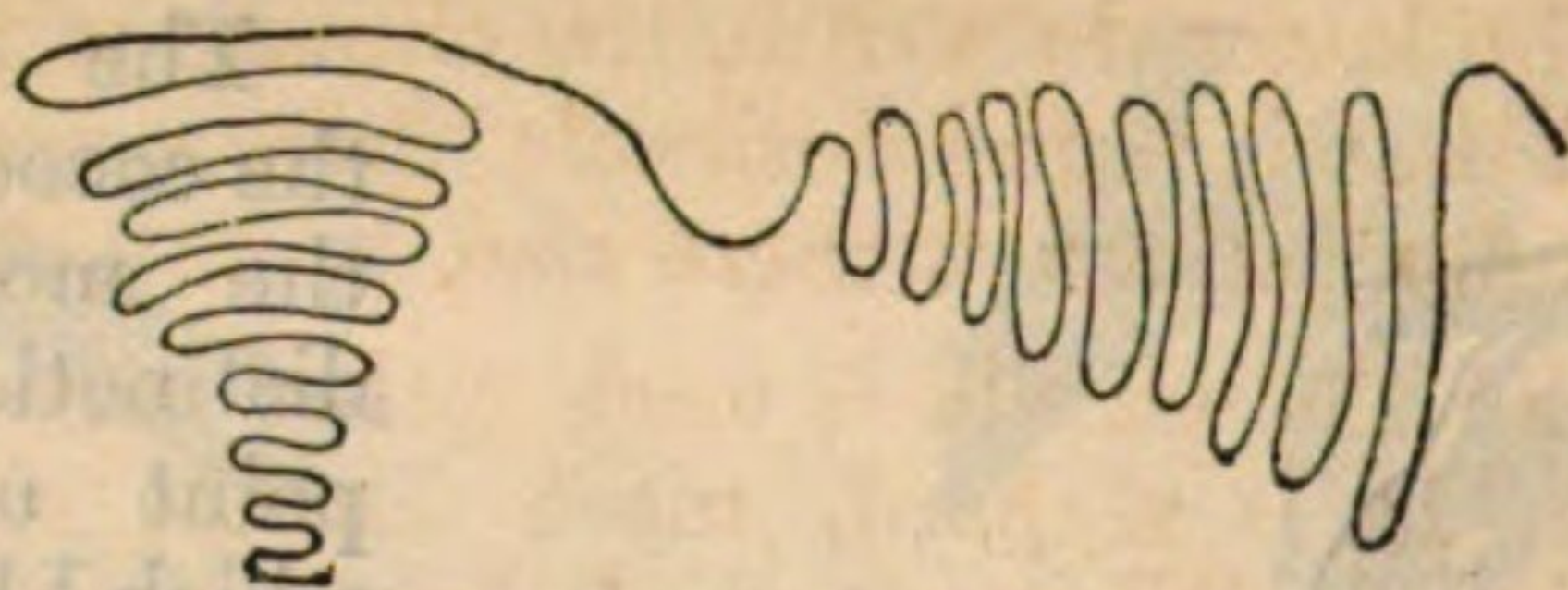


Fig. 13.—Mode in which the silk thread of the cocoon is disposed.

to make others at some little distance off, and sometimes at the other end altogether, the insect, when these changes were made, having obviously shifted its place. It uses these zigzags to strengthen first one place and then another, seeming to be guided by no rule, until the outside of the cocoon is completely covered in; and then it has only to fill up and fortify the interior in the same way to the proper thickness.

Difficulty of
reeling off
the cocoons.

No doubt the placement of the thread in the *open cocoons* will in many respects be very similar; but at the open ends it is turned backwards on itself and laid side by side along the immediately preceding part of the thread, to which it is glued so as to make it appear like one fibre. It must obviously, therefore, be much more difficult to reel the thread off these cocoons; but, within the last two or three years, the difficulty has been conquered by the Countess of Corneillan and by Dr. Forgemol, at Tournau, who have reeled off the silk to the length of 800 yards (the normal length of the mulberry silkworm thread is about 300) in one unbroken thread.

Still, the success is short of what is required for practical purposes. The process of reeling off the cocoons of the common silkworm consists of placing five or six of them in a basin of hot water, and, finding the end of the thread of each, uniting them and winding off the whole five or six into one thread, giving it a particular turn, which is essential. Whether it may be possible to reel off so many at once and give the necessary twist with such irregular cocoons as the open ones of the *Ailanthus* worm is doubtful—at any rate, I believe it has not yet been done.

Tusseh
moth bred
in India.

The “Tusseh moth” proper has not yet been introduced, nor is it likely to be so; it requires a hotter climate than any in Europe, and there is no inducement to go to trouble in regard to it, seeing that its silk is already an article of commerce in India, and if we want it we can get as much as we like in the same way that we get the silk of the common silkworm from Bengal. It is cultivated by a species of semi-domestication; but the Mantchourian and Japanese varieties

are wild. The latter do well in the climate of France in the open air, and if it is found desirable there seems no obstacle to their semi-domestication there also.

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

Tusseh silk.
Its quality.

In India the Tusseh silk is used either mixed with cotton or unmixed. It is a hard, most durable silk of a dark brownish colour. When used without mixture it is woven into a kind of cloth called Tusseh-doolhies, which is much worn by Brahmins and other sects of Hindoos. In this state the natives call it Korah. The Europeans settled in India employ it for summer cloths or to cover furniture. It is perfectly fitted for this use, because the stuff, in consequence of its firmness and brilliancy, looks always clean. Nevertheless, this silk, strong though it be, cannot resist very frequent washing, and ends by being cut when it has been subjected to the violent proceedings of the Indian washermen. When the Tusseh silk has been freed from gum and mixed with a little cotton, it is manufactured into more pliable tissues in designs of all forms and different colours. In this state it is extensively used both by the Indians and Europeans.

Ailanthus
moth bred
in China
and Japan.

The Ailanthus or Arrindy moth extends over nearly the same ground as the Tusseh; but, as already said of it, we have only two varieties, the one Indo-Chinese and the other Japanese. The former is reared in a domestic state over a great part of Hindostan, but more especially in the districts of Dinajpur and Rangpur, in houses, and feeds on the leaves of the *Ricinus communis*, or castor-oil plant, an annual in Europe, a tree in Africa and India, conspicuous for its broad palmate leaves, which have given it the name of *Palma christi*. From the causes I have above explained, the silk of this species has hitherto never been wound off by the natives, but they were obliged to card and spin it like cotton. Dr. Helfer (*Journal Asiatic Soc. Bengal* (1837), p. 45) says that it is so productive as sometimes to give twelve broods of spun silk in the year. The Japanese Ailanthus, on the other hand, only has two broods in the year.

Ailanthus
silk.

The cocoons of the Arrindy moth are soft and white, or yellowish. After the cocoon is carded and spun, like cotton, the yarn thus manufactured is woven into a coarse kind of white cloth, of a seemingly loose texture, but of incredible durability, the life of one person being seldom sufficient to wear out a garment of it.

The Japanese Ailanthus worm is reared by the natives in Japan in a semi-domestic state, and its silk is said to be largely made use of there, although it does not appear that

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

Introduc-
tion of the
Ailanthus
and Tusseh
silkworms
into France,
&c.

it is used for anything but coarse stuff. It feeds on the *Ailanthus glandulosa*, a Japanese tree, which is now almost as common in France and England as in its native country.

Seeing that the *Ailanthus* moth and two of the Tusseh moths (the *A. pernyi* and *A. yama-mai*) come from districts as temperate as that of France, and that all three feed upon plants which grow in the open air in France, no fitter subjects for what the French call acclimatisation could have been selected.

The possibility of rearing them in the open air has been fully proved by hundreds of experiments, and, in fact, the results of these open-air educations has been to naturalize at least one of the species (the *Ailanthus* moth), several instances being already recorded of this moth or its caterpillar having been found in gardens or places (chiefly in or near Paris) where no *Ailanthus* moths had been bred.

Open air
cultivation.

The advantages of this open-air cultivation are not few. It reduces the management of the education to the preliminary attention to *graines* and the coming out of the young worms, the placing them on the trees, the guarding them from birds (for which a watch is necessary, it need not be an expensive one,—a woman or a boy will suffice, and it is only for a month), and, finally, the collection of the cocoons. After the trees have been once sown with these silkworms, the cultivator has nothing to do but to leave them to browse for about a month, when he will find his harvest hanging to the leaves. It is undeniable that there is a great contrast between the simplicity of this procedure and the buildings, the heating, the numerous workmen required to collect and carry the leaves of the mulberry-tree to the magnanerie, to feed the worms four or five times a day, to clean the shelves and clear away the litter, and to provide and place the branches or heather stalks on which the worms may spin their cocoons. Another advantage dwelt on by M. Guerin-Meneville is that the *Ailanthus glandulosa* grows well on barren ground, so that the trees required to furnish the food need cost little or nothing for rent (always supposing there to be bad ground on the spot).

There is no comparison between the advantages of each thus contrasted, but it is still to be found out whether the harvest of the *Ailanthus* cocoon, when the experiment is tried on an industrial scale, will be equally or even fairly abundant; and, assuming it to be all that could be wished in that respect, the more important vital point still remains—*whether the silk of these new worms is worth introducing at all.*

Question
whether the
Tusseh and
Ailanthus
silk is worth
introducing.

So far as regards the quality of the silk, both of all the Tusseh and Ailanthus worms, we know that it is coarse, ill-coloured, and cannot be placed in competition with the most inferior of mulberry silk. At first, the silk of each, as it was successively brought into notice, was vaunted as being of first-rate quality—as good as mulberry silk in some respects and superior in others. But this high tone has long since been lowered. Dr. Royle, in his “Report on the Resources of India, as exhibited at the Exhibition of 1855,” mentions that one French manufacturer had commenced making “some plushlike material,” of different colours, of the Tusseh silk. But the mission of silk is not to produce plush; and if that is all that the yama-mai can do, it clearly can never be used as a substitute for mulberry silk. Dr. Royle further, in his “Productive Resources of India,” mentions that the Tusseh silk is a coarse, durable silk, which is much esteemed in India both for ladies and children’s dresses; for the latter especially, on account of its cheapness and durability. “This silk,” said he, “will probably become an extensive article of commerce, as some of it, having been sent on speculation to Paris in its unbleached state, was there employed as a covering for parasols, and was found to answer so well that an instantaneous demand for it sprung up.” The price advanced, and the quantity imported increased. In 1835 only 158 pieces; in 1836, 830; in 1837, 2,647; and in 1838, no less than 4,249 were imported. This is a fact by no means in its favour; for, notwithstanding this start, it has made no way, and is not now in the market, so we may assume that on trial it has not been found to answer.

M. Guerin-Meneville, in his later notices of the Ailanthus silk, seems to have arrived at a more correct appreciation of its nature and value. “As to the textile matter,” says he, “if we can get it thus at a very low price, it will hold a middle place between silk and wool, under the name of Ailantine, and appears destined to become in France what it has been from all time in China,—the silk of the people” (Rev. and Mag. Zool., 1859, p. 335). M. Guerin-Meneville forgets here, however, the difference between the climate of China and that of France, and that while in the one a light silken vestment is the most pleasant clothing, a good woollen coat will be preferred in the other.

When we recollect, too, what the price of cotton was and is (6d. to 2s. a lb.), doubts will arise as to the possibility of producing any silk at such a price.

Still, silk is always silk, however inferior, and uses will doubtless be found for it if it is once brought into the market in industrial quantities. This it has never yet been; all these silks

MR.
MURRAY
ON
PRODUCTS
OF USEFUL
INSECTS.

are wholly unknown in the silk market, and this I regard as the most unfavourable symptom of the whole. If the Tusseh were really good, it would have been imported long since, like the silkworm cocoons from Bengal; and of the others, even the home growth in France should ere now have made some sign. Experiments with the avowed purpose of introducing it have been going on for the last fifteen years, many of them by practical men desirous of making money out of it; and it is still unknown in the market. The question will soon be settled by the experiment now in progress of a regular Ailanthus silk-farm, which has been sanctioned by the Emperor, and is being conducted by M. Guerin-Meneville. But had the silk been really capable of being put to profitable use, I cannot help thinking that some of the many keen men of business in the silk industry who have tried it would have made something of it ere now.

Bee hives.

I should have wished to report on the many contrivances exhibited for housing bees and spoiling them of their honey, but none of the inventions of any importance can claim notice on the score of novelty; apiarians have for so long gone on improving the apparatus for rearing bees, that at last they have left themselves no new worlds to conquer. Any novelties in the apparatus consist merely of slight modifications of discoveries made and exhibited at the Exhibitions of 1855 and 1862. The most remarkable are the bars and frames contrived by Mr. Woodbury some years since, consisting of something like a liliputian empty window-frame, a series of which are hung up in or fitted into the hives, and the bees, by means of impressed guide-sheets of wax, are led to fill up the vacant space with comb and honey. The frames can be removed and plundered, or placed in other hives, or shifted about at pleasure. The impressed guide-sheets of wax are the production of a German inventor, and were exhibited in the Austrian department of the Exhibition of 1862. They have since been purchased and utilised by Messrs. Neighbour and Son. They are especially adapted for these frames, and are, in fact, the foundation on which the bees are invited to form the comb.

Bars and
frames.

REPORT on VEGETABLES —(Class 85.)—BY ROBERT
HOGG, LL.D., F.L.S.

DR. HOGG
ON VEGE-
TABLES.

THE only vegetables that are exhibited in a fresh state are a numerous collection of potatoes, consisting of no less than 158 sorts, in the Prussian department, and a number of esculent roots in the Algerian department. The latter will, perhaps, prove the more interesting to the visitor, as furnishing excellent examples of some of the esculent roots of tropical and sub-tropical regions, which are not frequently to be met with. Among these are large rhizomes of *Colocasia odora*, *C. antiquorum*, *C. violacea*, *C. sagittifolia*, and *C. esculenta*. Of these, the last is the one most extensively used. It is known by the names of Egyptian ginger, cocoa-root, eddoes, and yams; but the last name is more properly applied to a very different root. The rhizomes or large fleshy roots of this plant abound in starch, and form an important article of food to the inhabitants of the countries where they are grown. A peculiarity of the flowers is that they have such a cadaverous smell that flies deposit their eggs in them as they would in a dead carcass. Several roots of *Canna edulis* and *Canna discolor* are also exhibited, the roots of which are used as food, and numerous varieties of *Dioscorea alata*, a species of yam, which appears to assume every form of round, long, and palmate in the shape of its tubers. There are also many varieties of the tubers of *Batatas* or sweet potato—the potato of Shakespeare, which was largely imported every year from Spain and Portugal, under the name of “Spanish potatoes,” during the sixteenth century. They are extensively grown in the south of Europe, but are too tender for outdoor cultivation in Great Britain.

Of dry farinaceous vegetables there are some very extensive collections in the Portuguese, the Italian, and the Russian departments. In the Portuguese will be found a large collection of many varieties of haricots, which, unfortunately, are not distinguished by any special names, thereby precluding the possibility of making allusion to any of them individually. Here may also be seen many samples of “Gesse,” or, as it is called in England, chickling vetch. It is the *Lathyrus sativus* of botanists, and flour made of its seed is used in Italy, Spain, and Portugal for making bread; but so remarkable an effect does it produce on the animal

Dry farina-
ceous vege-
tables.

DR. HOGG
ON VEGE-
TABLES.

system that it is necessary to mix it in half the quantity with wheat or other flour. If used alone for any length of time it produces extreme rigidity of the limbs, and swine fed upon it entirely lose the use of these members and become exceedingly fat, lying on the ground. In all the departments already named will be found numerous examples of the ram's-head or chick pea. It will be found marked "Pois Chiche." It has been called by botanists *Cicer arietinum*, from the great similarity the seed bears to a ram's head; and its English name of chick pea is in allusion to a fancied resemblance it has to a young bird coiled up in the shell. The seed is used in the south of Europe in the same way as we do garden peas, in soups and other dishes; and about Naples the children and common people eat them raw when they are yet tender. By the Spaniards, who call them "carvancos" or "garavanzos," and the Neapolitans, who call them "cece caliato," they are roasted, ground, and formed into an agreeable infusion resembling coffee. A remarkable peculiarity of the plant is that during the excessive heat of summer the leaves and stems sparkle with minute drops of an extremely acid, thin, viscous liquid, which has been found to be oxalic acid in a state of purity.

In the Italian collection of haricots there is one that might be introduced with advantage into English gardens; it is called *Fagioli del Giappone*, and has been cultivated successfully by the Acclimatisation Society of Paris. It is a small round seed of the shape and colour of a green pea, and its colour would doubtless prove a high recommendation.

Preserved
vegetables.

In most of the departments preserved vegetables may be found, but particularly in Holland and Russia. The Dutch are remarkable for the brilliancy of their colour and their fine condition. They consist of carrots, peas, cauliflower, red cabbage, Brussels sprouts, cabbage, chick peas, and turnip-rooted celery. Besides these, in the Russian department there is a large collection of preserved mushrooms.

REPORT ON FRUIT TREES.—(Class 86.)—By the Rev. T.
C. BRÉHAUT.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

THE section of the reserved garden appropriated for the exhibition of trained fruit trees is adjacent to the Ecole Militaire, and runs parallel with it. To reach this section either the whole building must be traversed or a distinct entrance is found at the Porte de Tourville.

A portion of the trained forms is also exhibited at Billancourt, the chief interest being in the garden itself.

As it was impossible to allot sufficient space to the large specimens which best represent this branch of horticulture, or, indeed, to transport any such, the trees in general are too young accurately to illustrate each particular system.

From want, also, of root space, and being necessarily crowded, together with their recent change of situation, a crop of fruit is wanting during the season. Bearing this in mind, there is much which will please the intelligent observer in this section, and an occasion like the present will not readily recur.

Horticulture of late years has made rapid progress, not only in our own country, but also on the continent. While, however, England has utilised the resources of her mechanical skill in producing unrivalled glazed structures for the ripening of exotic fruits, and, especially, by the introduction of orchard houses, has popularized a taste for fruit culture in hitherto unapproachable respects, the continent has remained comparatively indifferent in these matters. It is only, therefore, in the exhibition of trained trees adapted for the open air that the English visitor, and especially the amateur class, now so large, has anything to learn from abroad. But here the French and Belgian horticulturists have always held a high position, and still merit it. Possessing, as they do, climates and soils differing widely from our own, but extending over so comprehensive a range in themselves as to meet ours in various ways, it must prove instructive to remark what general principles are in present estimation among them, and to record wherein these principles have progressed.

In considering this, we must not forget that the general subdivision of property in France and Belgium has created

Continental
horticul-
ture.

Small pro-
prietors.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

J. T. YER
FRUIT
TREES

a numerous race of small proprietors, warmly attached to their lands, and eager to secure a good return from them. Such a class becomes an accurate discerner between true and false theories, and is apt to be somewhat slow and impatient of innovation. There are few or no large landed proprietors, as with us, who embark largely in horticultural pursuits of an expensive nature, nor is fruit culture much directed by such as these. But there exist a wide-spread intelligence and a keen sense of what is profitable and useful among the numerous small possessors of land, cultivated by them as a garden of necessity. It is satisfactory then to find that amongst this class also the principles which rule over modern fruit culture have made good progress, and also that the specimens exhibited show a recognition of these principles.

No visitor can fail to remark the general coincidence of taste for regular symmetry of form joined to accuracy of detail. Not a single object can be pointed out which is at variance with this theory. There is literally nothing resembling the irregular and ill-balanced forms so common in England in this section, for which the changeableness of our climate is alleged as an excuse. But even the opponents of regularity of form abroad (and there are some) declare that this regular method of training best suits our English climate. The amateur, and especially the orchard house proprietor, will note with satisfaction many new and admirable specimens perfectly adapted to economise his valuable glass or wall space. Some of these he could hardly expect to find even depicted in horticultural works, so novel are they. Others, though not unknown, have hardly as yet met the attention they deserve.

It will also be evident how much modern ideas respecting fruit culture have been modified of late years. Many more trees, of forms corresponding to the change, are now planted than formerly. A long season, and a succession, comprising new and valuable varieties, are now required by modern taste. The advantages of such a practice are evident, and comprise some of the chief requirements of good culture.

It is instructive and satisfactory to find that the same conclusions have been arrived at in other countries through the same amount of antagonism. And when we discover that this result has been brought about by a class of practical and intelligent men of no great means, we are the more convinced of its soundness.

Schools of
continental
fruit culture.

There exist, of course, various schools representing phases of continental culture, which, in noticing the objects exhibited, we can assign and distinguish. The oldest form of

these is the Montreuil school, well known, by name at least, in this country. It still flourishes on the continent (in France and Belgium principally), and shows the best style of modern long pruning. It is accurate in detail, eschews all irregularity, is generally good in developed forms, and has some ancient shapes as yet unsurpassed for low walls. One first prize is given to forms shown by M. Chevalier (Ainé), and a second is allotted to M. Gillechens (of Belgium) for trees trained in this style. In our opinion these last will be preferred by English visitors at least. M. Chevalier's trees comprise a 30 feet long "palmette" with horizontal branches, the "coursonnes" of which, "à la Montreuil," are perfect, and recommended to the admirers of long pruning. But even these will join us in agreeing that the intervals between the branches show the inherent defects of this system, being too wide. With closer pruning the crop could easily have been increased by one-third. Another tree, by the same cultivator, is a waved "palmette" with double central leaders, both are wall trees. M. Gillechens shows several fine peach trees (also in the Montreuil style), in which the double central leader is adopted. This plan controls the main sap, aids in constituting the lowest branches, and is one of the very best hints furnished in this section. It is much adopted abroad at present, and recurs frequently here and at Billancourt.

Figures 2, 5, 6.

The trees which illustrate another distinct school of much repute abroad, that of Professor Dubreuil, are the oblique or diagonal cordons, chiefly of pear and apple trees. These are nearly all very closely stopped in their shoots; but an interesting specimen of M. Dubreuil's early style is exhibited by M. Gillechens, consisting of a vertical peach cordon, having the side shoots of 12 in. or 15 in. in length. Though close pruning has superseded this fashion it might still be well adapted for peach trees on the open wall in some localities. At any rate, it is new to most visitors.

There are good diagonal (pear and apple) cordons in this section, and also some, by Professor Gressent (a leading name), at Billancourt. These diagonal cordons have been so long recommended by the writer, from his own experience, as very suitable for our climate and wants, that it is hoped a visit to these trees may remove some doubts. In a few years, when better known, they will be universal favourites in England.

In front of these diagonal cordons, here and at Billancourt, will be seen those low lateral apple cordons, trained

Figure 1.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

on wires, and bearing, on closely stopped shoots, the second season; which, for edgings of borders, will soon become common everywhere. Other crossed cordons of apples may be seen here worthy of notice.

The newest and most modern school, founded by Mr. Grin, of Chartres, is, unfortunately, not represented here, save by imitators. Its influence on modern ideas is, however, visible enough in the minute attention paid to the close summer stopping of the shoots in the growing season, which leaves little to be retrenched at the winter regulation. Formerly, the reverse of this was the rule. It is therefore to be regretted that no specimen of M. Grin's own work is here shown. His extremely close style—bisecting the stipulary leaves—can best be judged by inspecting the trees themselves. Without committing themselves to this very close method, M. Grin's adherents have obtained excellent results.

With modifications rendered necessary by the exigencies of our humid climate, the principles involved in this system are well calculated to succeed, and will eventually (as they have already done in the case of orchard house trees) supersede the older fashions of long pruning.

Figures 2, 5,
6.

Among the wall trees exhibited are excellent double "palmettes," either with the branches trained horizontally, diagonally, or arched downwards. The last fashion, for low walls, in humid localities, is excellent. A "palmette," with double central leaders, and extremities of the branches turned upwards "à la Verrier," is perfect. It is a pear-tree, but this style would suit any variety but the cherry. Specimens of forms with single main leaders are common. The finest is a large peach "palmette à la Verrier." Messrs. Janin and Durand have prizes for apricot and plum trees, and for pyramids. The last present excellent forms, which are well adapted to resist the violence of storms. A four-winged pear standard, the extremities of the branches turned sharply upward, and attached to the nearest above, is very beautiful. So is a large standard pear at Billancourt, in the centre of what is called the Emperor's garden, by Baltet (Troyes), which is admirably calculated to admit light and air, besides providing resistance against wind.

Figure 3.

Figure 4.

There are other trained forms which require no notice here. Those described are the most characteristic of modern ideas. They have all the leading points necessary for good fruit culture, such as regular symmetry of form, true balancing of either wing, and close attention to systematic summer stopping of the shoots. The visitor will not find

here the irregular fan which finds so much favour in England, and is surely so out of harmony even with the present taste for geometrical flower-beds, at least in small gardens, where unavoidably visible.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

Connected with this subject in some measure is the show of vines at Billancourt. But these are mainly vineyard forms, and should be studied under this idea. M. Charmeux, of Thomery, carries the prize for his system, which is in high repute in France. Some hints for ground vineries may be taken here from the arched vines, which are so prolific. These ground vineries have not been as yet much noticed on the Continent, though of obvious value. Neither are orchard-houses appreciated, though by their means the amateur can afford to look without regret on the best results of a splendid climate. His chief aim should be to utilise any hint afforded by beauty of detail, in which Continentals often excel, and which so well suits for his work.

Trusting to their climate, our neighbours have little faith in the need of such things as tiffany protectors or other appliances, now so well known in England, but not shown here. They are, however, recommended in their best authors, and are as much required in the northern districts (especially near the seaboard) as they are with us. It is to be regretted that none were shown by English houses, as well as some other matters connected with fruit culture. The results of international exhibitions are seen in some fair potted trees from Montpellier, and some ingenious portable shelters for these trees, not without interest and capable of development. In this respect the south of France has borrowed ideas of value from our cultivators which we should have expected the northern districts would first have appreciated.

On the whole, then, the English visitor may look with much interest on the trained forms exhibited, and note the general agreement of Continental opinion in the value of symmetrical disposition, joined to a much closer attention to detail than as yet obtains in our practice. The increasing conviction that better results can be obtained from the use of more glazed structures (wherein economy of space is a great object, than by following more ancient customs in days when these houses were not so obtainable, will cause any new form to be a valuable hint to follow. Had Continentals adopted such valuable appliances as ground vineries, and especially orchard-houses, the exhibition of this year would have shown far higher results.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.]

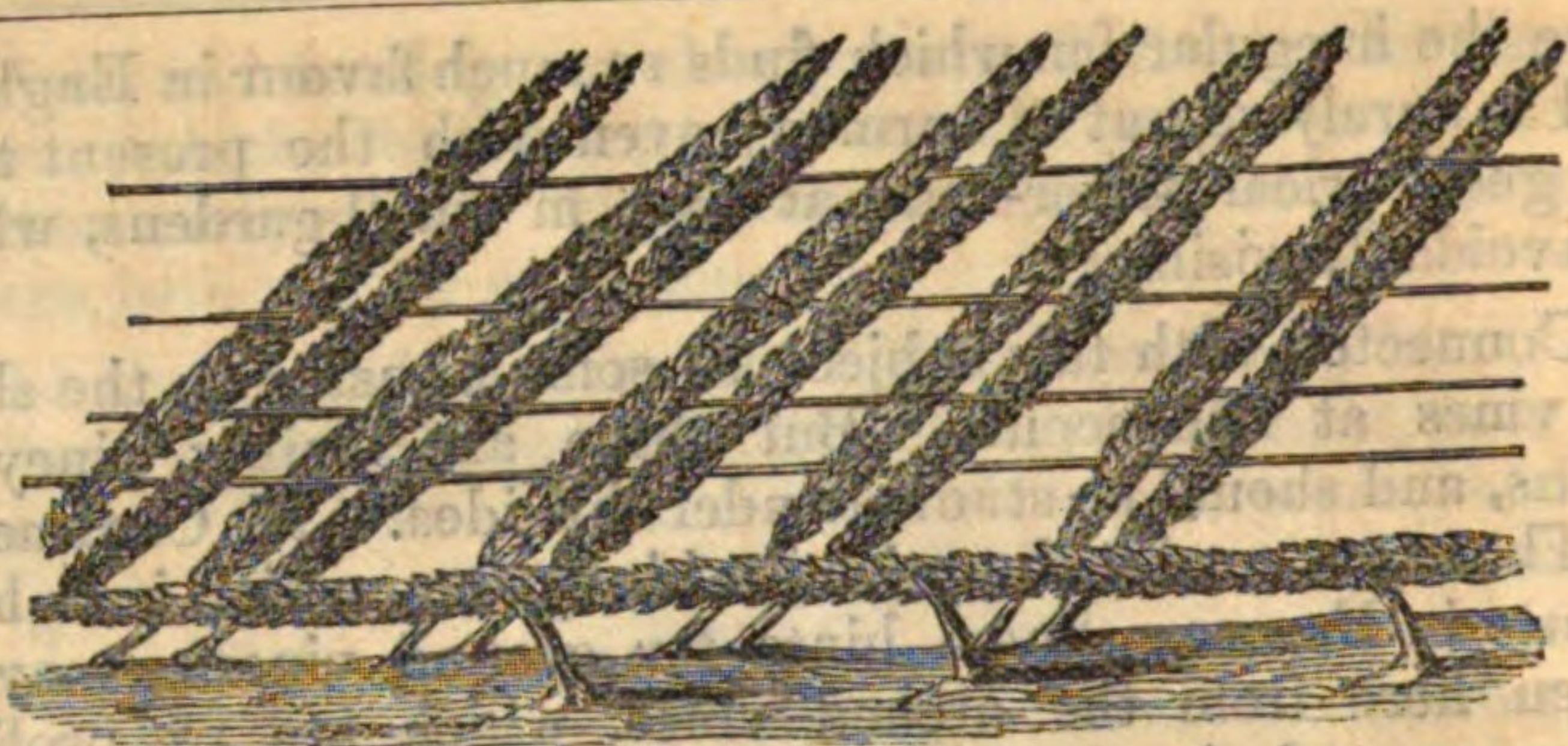


Fig. 1.—DOUBLE ROW OF DIAGONAL PEAR CORDONS.

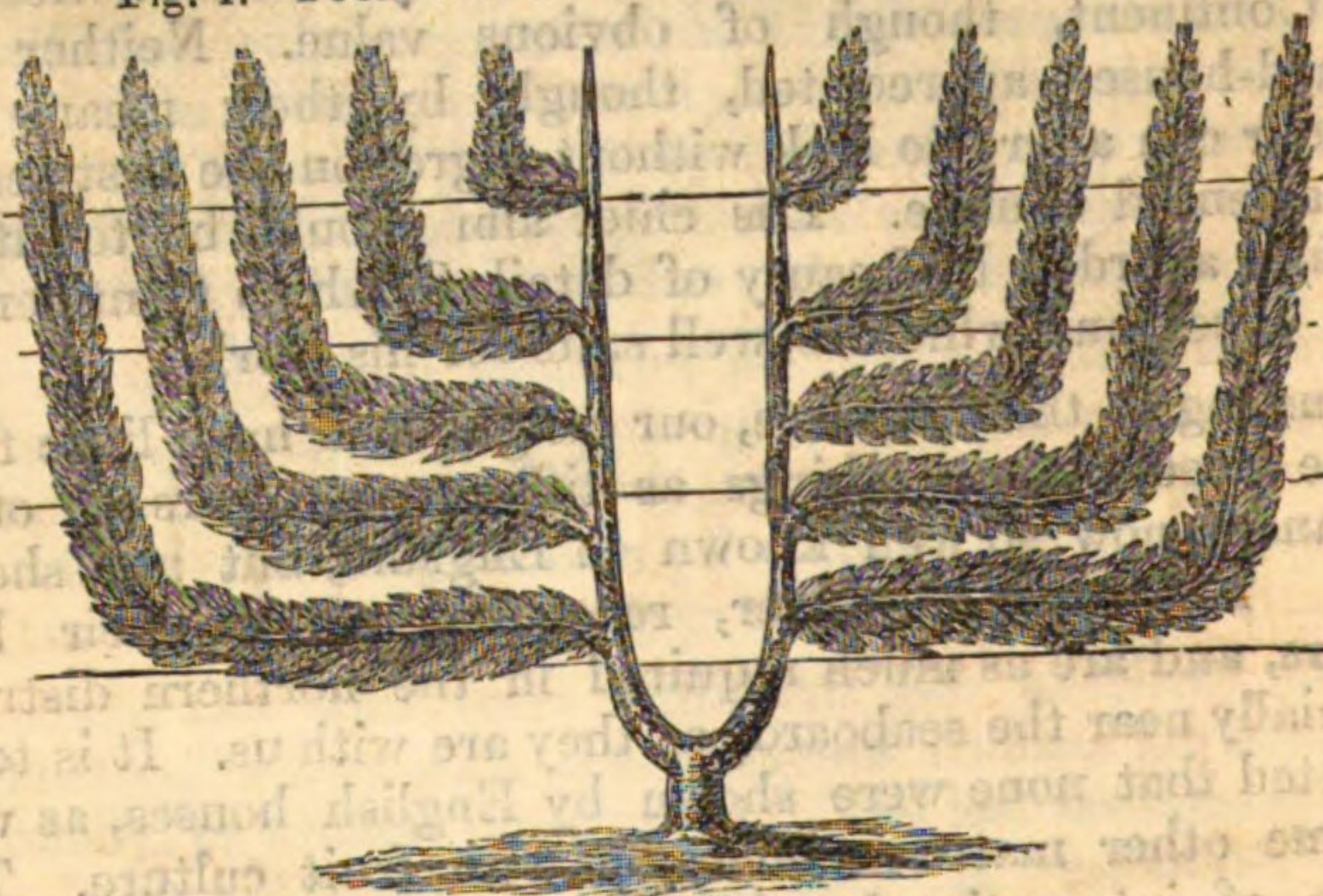


Fig. 2.—DOUBLE PALMETTE À LA VERRIER.

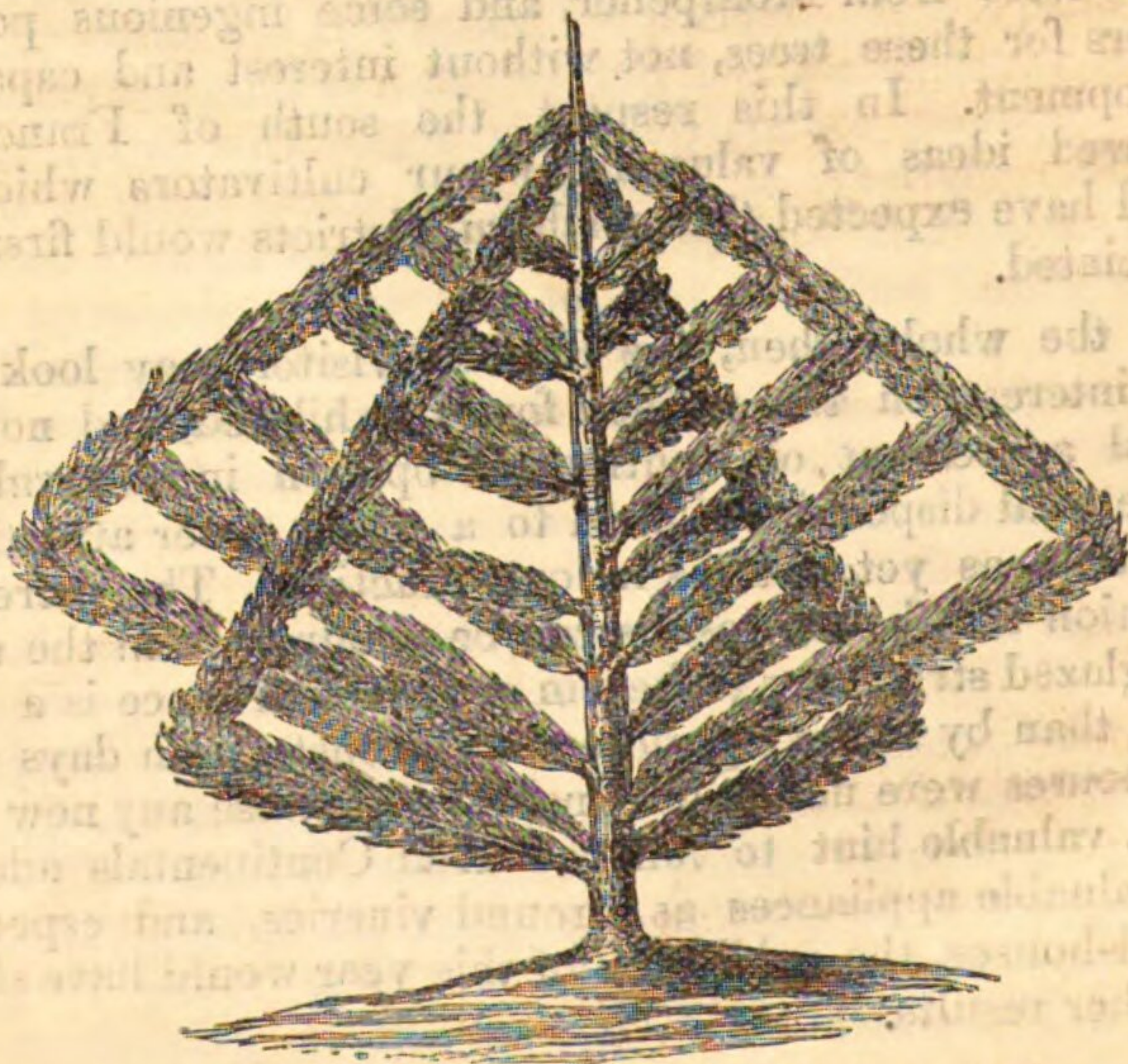


Fig. 3.—STANDARD PEAR TREE WITH FOUR WINGS.

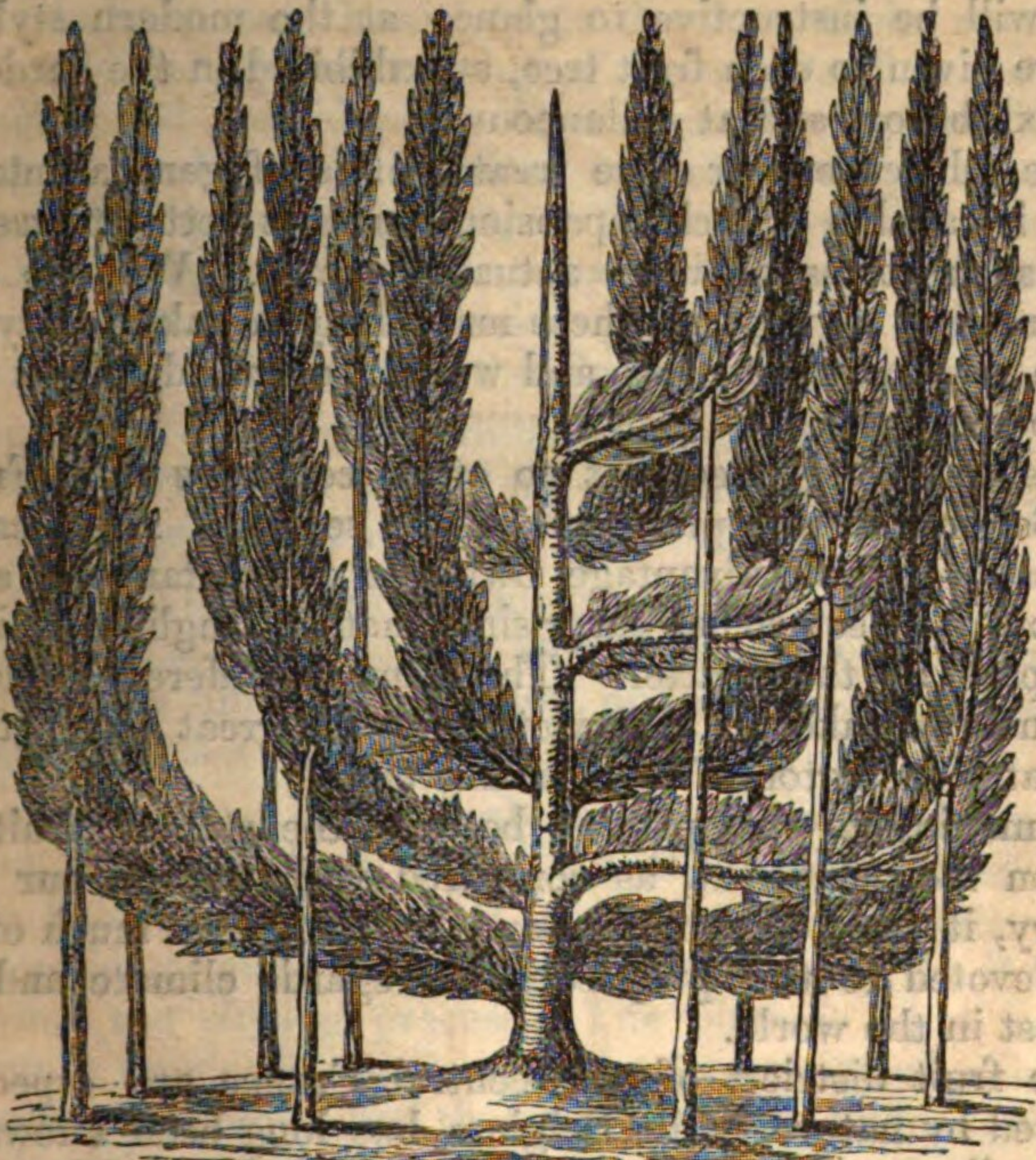


Fig. 4.—STANDARD PEAR TREE AT BILLANCOURT.

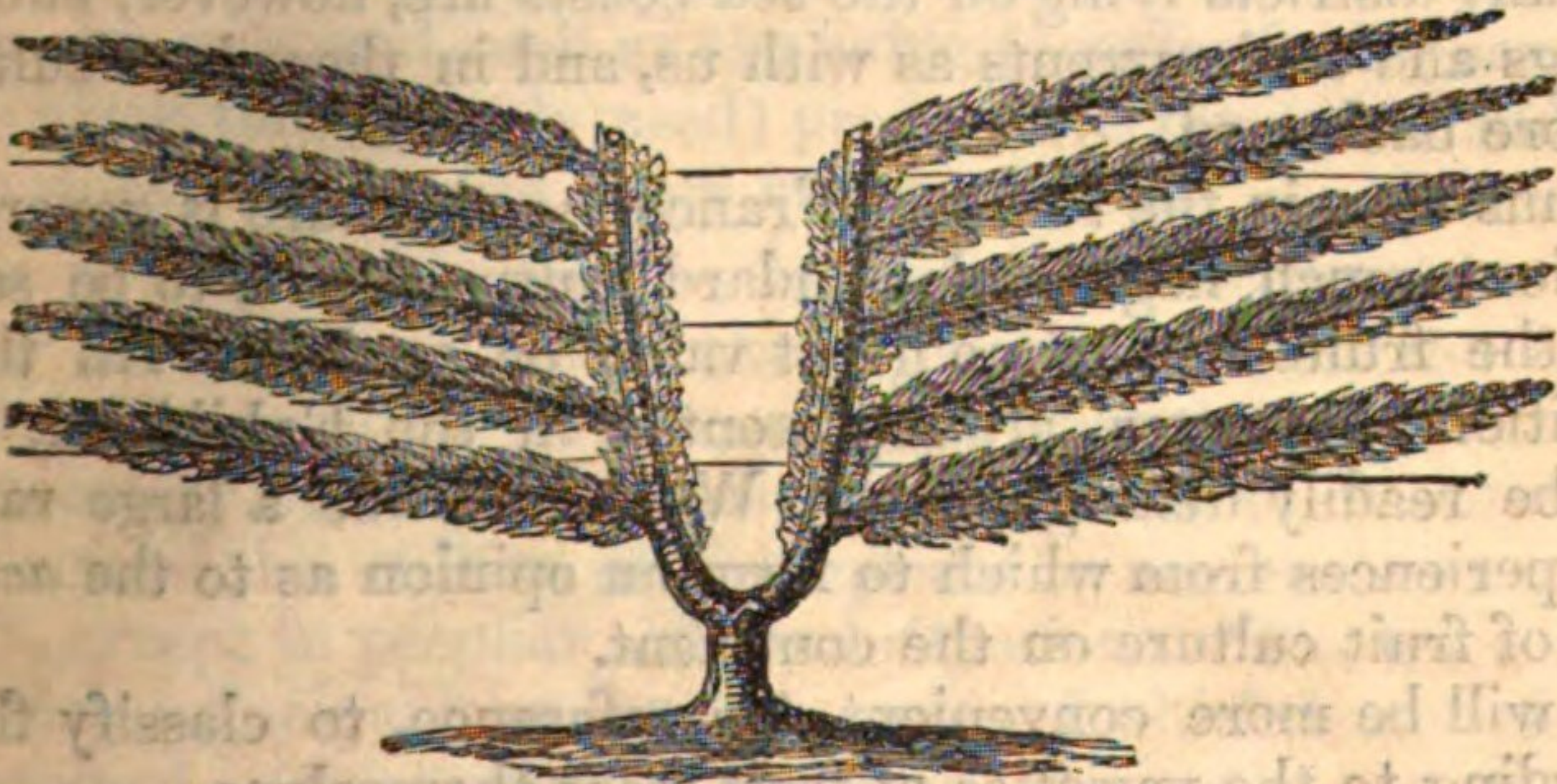


Fig. 5.—DOUBLE PALMETTE WITH OBLIQUE WINGS.

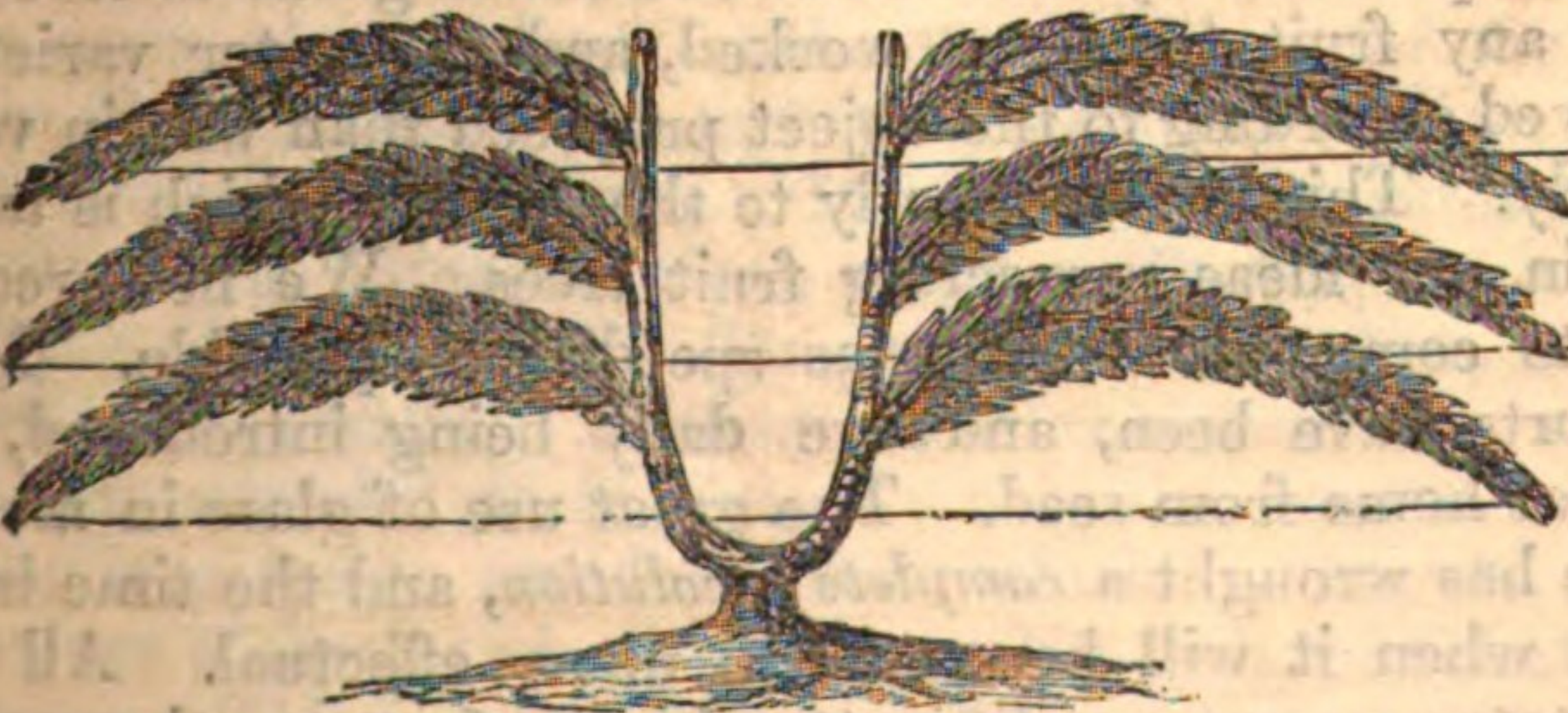


Fig. 6.—DOUBLE PALMETTE WITH ARCHED WINGS.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

It will be instructive to glance at the modern style of culture given to each fruit tree, as exhibited in the garden of the Exhibition, and at Billancourt.

The subject matter here treated of is of general interest, but it is capable of such expansion that it is better to restrain it to such forms as were actually shown. We are quite warranted in saying that these may fairly be taken as typical of the *most modern* ideas, and would be considered as such on the continent.

French and
Belgian
exhibitors.

It is to be regretted that no other countries than France and Belgium were represented in this section. America was necessarily at a disadvantage, owing to the distance of situation, but it is somewhat surprising that no English exhibitor took part in the matter. The same indifference allowed foreigners to take an easy victory at the great international show at Kensington of 1866 in this class.

English.

In making any comparison between the state of fruit culture on the continent, as compared with that in our own country, it must always be borne in mind that much of the land devoted to this purpose is, as regards climate and soil, the best in the world.

Mid-central
districts.

The fruit districts of mid-central France are especially favoured by nature, while Belgium has long been known for the excellence of its produce, and the skill of its cultivators.

Sea-coast.

Many districts lying on the sea-coasts are, however, subject to fogs and cold currents as with us, and in these horticulture is more backward.

South
districts.

Thus also, in the south of France, horticulture is generally inferior; much neglected standard cultivation is to be seen, and the fruits are of no great value or quality. All these conditions, however, are represented in the Exhibition, and can be readily distinguished. We have thus a large range of experiences from which to form an opinion as to the *actual state* of fruit culture on the continent.

It will be more convenient, for reference, to classify them according to the varieties of fruit trees themselves.

Fruit cul-
ture in a
state of
transition.

In the present day increased attention is given to stocks on which any fruit trees are worked, and a greater variety is employed according to the object proposed than was in vogue formerly. This is due greatly to the change which is taking place in our ideas respecting fruit trees. We now require these to come into bearing as speedily as possible. Many new sorts have been, and are daily being introduced, and raised at home from seed. The great use of glass in modern culture has wrought a *complete revolution*, and the time is not distant when it will become still more effectual. All this necessitates a corresponding attention to the trees themselves,

Use of glazed
structures.

and a studious care how best to develop their respective qualities. The style of training of trees is itself in a *state of transition*, and considerable discussion takes place in the leading horticultural publications in this country and on the continent at the present time, as to the respective merits of these *new systems*. For this reason alone, if for no other, a study of what foreigners consider as the *newest* and the *best styles* must be of interest to the English visitor.

There was exhibited at Billancourt an interesting collection of stocks for fruit trees, some of which are more in favour abroad than with us, and others the contrary.

In the case of the apricot, for example, the style of culture devoted to it is different from what it is with us, for this tree requires more sun than we enjoy, and is best cultivated here in orchard-houses where it is excellent.

Apricot
culture.

The stocks most in favour abroad are the free, the plum, the almond, and the black thorn. In Belgium, the free stock, of late, is much in vogue. It forms trees of moderate vigour for pyramids or half-standards, and is thought by the Belgians to favour the stoning process. The plum is what is most commonly employed, as it suits the generality of soils of a moderate consistency, and those exempt from undue moisture. The almond produces trees of large dimensions (such as are in favour in the southern districts of France), and it is precious for rocky soils, and such as are liable to suffer in dry seasons. The black thorn (rarely used) produces feeble trees, and the trees worked on it give a few but fine fruits.

As the apricot is apt to languish at the extremities (differing in this from most other fruit trees) it, on the other hand, is apt to throw out gross shoots from the base. Hence the necessity of adapting the style of training to remedy this. In England the culture of the apricot is uncertain as to the result, except in peculiar soils and situations. The trees often lose their principal branches, the cause of which is not clearly ascertained. According to Dubreuil, the apricot, as a standard, does not succeed north of the latitude of Paris. Few things more clearly show us the extreme heat of the sun's rays in France than the fact that standard apricot trees should flourish so far north. It is true the varieties are of no great value. Peaches ripen also near Paris with only the aid of the sun till 10 a.m. The apricot loses its flavour when trained against walls. The culture of this fruit, as a rule, is not much attended to in France; only the *most elementary* pruning is given to standard trees, which are largely grown to produce a cheap and abundant market fruit, useful also for preserves. This is much deprecated by writers on horticul-

Mode of
training.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

Apricots
"en cordon."

Figure 1.

tural subjects at present. Standards of the Breda succeed better than the peach apricot.

In private gardens the apricot is much trained "en cordon" diagonally. Straw mats, thickly plaited, are placed at the rear of each espalier, and are removed in May, when the dangerous spring frosts are past. Screens of tiffany or canvas are now recommended to preserve the blossoms in the spring. The value of such protections to all fruit trees is not yet *sufficiently* recognized abroad, or at home. Low horizontal cordons, such as are represented in Figure 1, are now advocated. They possess great advantages in ease of shelter from currents of cold air, and also from the radiation of heat from the earth (close to which they lie), and if planted at the feet of other trees (over whom a sheet is drawn for protection), this may be easily made to extend so as to include the horizontal cordons also. In some favoured situations in England this might be attempted, the cordons being at about 12 inches from the earth only, closely pruned, and trained on wires. At any rate such culture would be *quite new* to any English gardener, and if the apricots were alternated with plums, and these intergrafted, some novel results would follow.

Palmette
verrier.
Figure 2.

This is *one hint* afforded by an examination of the *best foreign* culture. Walls are not so common abroad as in England in gardens, for many obvious reasons, and when used are rarely so lofty as ours. These are devoted chiefly to the vine, either "à la Thomery," or somewhat wildly running along the upper portions of the walls. These walls are rarely devoted to apricots of course, but where so employed the palmette verrier is what is preferred as a form. This excellent form resembles Figure 2, but is superseded by the *better* and *newer* shape here represented, in which the *double central leader* enables the cultivator to regulate and divide the strength of the ascending sap. Figures 5 and 6 exemplify the popularity of this form of tree.

There are many varieties of apricots cultivated abroad, which are well known here in orchard houses.

Cherry
culture.

The stocks exhibited for the cherry were the well-known *Cerasus Mahaleb* (Prune de St. Lucie), and the common wild cherry. The Mahaleb is as popular in France as it is in this country. It suits unfavourable soils, and especially certain kinds (Morello and Duke) for bushes, an excellent mode of culture for this fruit. This stock is also employed for wall trees when of no great lateral development; such as are becoming more common. Some kinds of cherries (Bigarreau and Heart, or Guigne) succeed best on the common wild cherry stock. Root pruning of cherries, or indeed of

Root prun-
ing.

any other fruit tree, is not in favour on the continent, nor possibly would their dry evaporating soil require it as in England. Cherries are cultivated everywhere as large standards, very picturesque in the spring, as travellers know, for the market produce and other reasons. Many new varieties of this popular fruit have of late been raised abroad, and in America, and introduced into England.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

Some writers strongly advocate the cordon system for cherry training in private gardens. Some varieties which do not naturally grow strongly are better adapted for this style. Professor Gressent is greatly prepossessed in favour of horizontal cordons, as in Figure 1, and these would be very valuable in many situations in English gardens, and, at any rate, quite novel. Trained at 12 inches from the earth, and grafted, each tree on the next to it, they would occupy but little space as edgings to borders.

Training.

Plums are largely grown as standards for market purposes and for preserves. But, unlike the apricot, the plum improves from a wall. Leading continental authorities, therefore, advocate a portion of wall space being devoted to them, as is the case with us. Pyramids are favourites in private gardens, and plum trees, "en cordon," diagonal and horizontal, both shown in Figure 1, are greatly recommended. An horizontal cordon of plum trees would be, no doubt, successful in English gardens, and has not, as yet, been even thought of. Varieties of feeble growth should be chosen, and the training is similar to the cherry in all respects.

Plum cul-
ture.

We come now to pears, which are the staple of French and Belgian gardens. No small proprietor but devotes the greatest share of his garden to the pear, and relies on it as his chief auxiliary. Continentals are essentially economical, and accordingly we find them setting a peculiar value on this fine fruit. Many varieties attest by their names their French and Belgian origin. Possibly the last are most in favour here, owing, partly to the greater similarity of climate, and partly to the skill of Belgian raisers. Of late years, however, much attention has been given by English nurserymen to the kinds best suited to our wants, and they may be trusted from their superior local knowledge. The experience of continental horticulturalists is identical with that of ours, and chiefly of such men as Mr. Thomas Rivers of Sawbridge-worth Nurseries, as to the value of the quince as a stock for the pear. It is mainly by Mr. Rivers that this change has been effected, being *another advance* from systems requiring generations to perfect them. Especially would such a change be beneficial in our English soil, where a surface rooting stock is of the *greatest* value. The free stock forms

Training
"en cordon."

Pear cul-
ture.

Varieties in
favour.

Pear stocks.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

larger trees (such as were once in fashion here), but these are *too* slow in coming into good bearing. It is still useful for soils unfavourable to the quince, such as a light, dry, evaporating soil, where the quince languishes. Certain feeble trees are also always grafted on the free stock to invigorate them. Pears in France are occasionally, but rarely, worked on the service tree (*Sorbus domesticus*), and this produces trees of a vigour intermediate between the quince and the free, and is adapted for silicious soils. The white thorn is sometimes used in France. It lasts a long time, and succeeds where other stocks fail.

Double
working.

Double working, especially of English origin, is *unknown abroad*, though its advantages are obvious and great.

Training.

Pears in France are rarely planted against walls. The favourite garden shapes are the pyramid, as with us, and the U shaped, or, as they call it "en gobelet."

Pear tree
with wings.
Figure 3.

Figure 3 is a representation of a very elegant and useful shape sometimes employed for the pear abroad. Besides the great beauty of its form, so well adapted for the small gardens of the amateur, and most beautiful when in bloom, it has the great *practical merits* of being easy to form (the extremities of each branch, when the decided development has been once attained, being merely turned upwards to those above), a free circulation of light and air is admitted to every portion, and *no violent gale* can injure the branches, nor cause the fruit to become bruised. It is hardly known how great a portion of the pear crop is injured from *this cause* in equinoctial gales, when the fruit is large, and easily bruised. This form may appear to some fantastic, but a closer study of its advantages will not fail to convince the amateur of its real value. The English eye is accustomed to such irregular and ill-balanced shapes that regularity and symmetry of form have not the favour *yet* which they will *eventually* attain to when really understood.

Standard
pear tree.
Figure 4.

Figure 4 is another very excellent form of standard for pears, exhibited by Baltet of Troyes, one of the best French cultivators, in what was popularly known as the Emperor's garden at Billancourt. In this fine and regular form ample provision is made for trees on any stock to attain considerable lateral development. In fact, the beauty of this form is thereby materially augmented. It is extremely easy to form, as easy, in fact, as the *most irregular* standard; as soon as the branches have attained to the development intended they are sharply turned up vertically, and an upright pole placed under each to which the extremities are attached. Light and air are abundant, and violent gales of wind innocuous. An immense crop can be realized from trees in

this form, the lower branches are constituted regularly, and are not permitted to languish as in pyramids. It is an excellent shape and *much* to be recommended.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

A favourite form of training the pear is "en cordon." The meaning of this term, likely to be the favourite style of future English training of trees, is literally "rope-like," *i.e.*, the shoots on the branches being closely spurred in to 4 inches (according to the variety, some being longer between the buds than others), the trees gradually assume a cable-like appearance.

Pears "en
cordon."

Cordon training, "pur et simple," is properly used to designate trees planted closely together as a single stem, (though this is frequently augmented to a double or a triple stem), on which stem or main leader the lateral shoots are kept close for fruiting. This system, which is probably one of the *most remarkable advances of modern fruit culture*, originates with Professor Dubreuil of Paris. This earliest system, however, differs from what is in vogue at present, in this respect, that the side shoots are much longer than in the newer mode. Specimens of this first style may be seen at André Leroy's nurseries at Angers, which is the leading French nursery.

The subsequent popularity and success of the *latest and most useful system now known*—that inaugurated by M. Grin of Chartres, near Paris,—induced the modification of the original cordon, so that it has, at length, attained the *true cordon style*, which is so valuable in its results. For orchard-house training and pruning it is admirably adapted, and, no doubt, will eventually exercise a great influence over some ideas as to the proper regulation of fruiting shoots.

The true
cordon.

There are several kinds of pure cordons. Of late the name has been extended so as to include trees of larger shapes, nevertheless such was not the case at its origin. The *diagonal* is the best and the purest form, being that which first of all was attempted, and which still retains all its merits.

Diagonal
cordons.

Figure 1 shows what is meant by the diagonal cordon; an *horizontal or lateral cordon* running along the base of the illustration. These diagonal cordons are destined to play a *great part in all future English gardening*. They are adapted for any wall of moderate height, and for amateurs with small gardens are invaluable, enabling such to have a *succession* of leading sorts of fruit, no mean gain. By this method of training, walls are rapidly clothed; the trees come sooner into full bearing, the fruit is finer in quality, the produce is greater, the formation is simpler than any other, and changes can be better effected than in any other fashion. These are obvious advantages, and it is only surprising such are not

Figure 1.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

better known in England, where every progressive change is readily appreciated. The attention of English amateurs is *especially* directed to these cordons. They are becoming known and liked in North America.

It may be useful here to record the opinions of the very best authorities on the continent on this point, our leading object being to take what *foreigners would themselves consider* as best for English adoption.

Continental
opinions.

Professor Dubreuil says, "This form (the diagonal cordon) is much less difficult to establish than any other, it allows us to cover regularly all the surface of a given wall in a much shorter lapse of time, and causes trees to produce their maximum much sooner, without shortening their life." There is no writer of greater weight than the Professor on these matters on the continent, and we may also quote the opinions of Professor Gressent, whose works have at this moment the greatest sale abroad, and are sanctioned by the Minister of Agriculture for State Establishments. "I have," he says, "a marked preference for the diagonal cordons, they are the easiest to form, and their produce alone excels that of the rest of the fruit garden."

Spiral cordons.

The present writer, long ago, was the first to introduce the diagonal, and also the spiral cordons into this country, and the first-named form has never been equalled for the back wall of orchard-houses, nor the second for the borders of these structures. For pears, on the open wall, nothing at all equals it. It is recommended by the judges of the Exhibition for our English climate, as suiting this style even better than that of France.

Horizontal.

Horizontal cordons are also an excellent style for training the pear as edgings of borders.

Pyramids.

The main crop must always be from standards, such as pyramids, and goblet-shaped bushes for exposed situations. English pear culture in these respects is admirable, considering the trying nature of the climate which requires walls to shield fruit trees. Wall training may also be said to be common in Belgium in exposed parts.

Apple culture.

Apples on the continent are grafted on the free stock, the Doucin and the Dwarf Paradise. The Doucin, probably of French or Dutch origin, is identical with the "Dutch Paradise" of Miller, an old English writer of the last century. It is an excellent surface rooting stock, and produces trees of less vigour than on the crab. It is much used abroad for pyramids, and is considered there free from canker, not so here. It thrives in indifferent soils. The varieties with small leaves are not liked, the true sort has large dark brown leaves, spotted with white.

The French Paradise stock is not exactly identical with what we call Paradise. It is probably the "dwarf apple of Armenia" of Miller. It has the remarkable property of dwarfing the graft into very miniature trees, very useful for pot culture. Much of the so-called Paradise used in this country is a native seedling, hardier than the French stock, surface rooting, and adapted for the climate. The English Paradise, in fact, has more affinity with the French Doucin. The common crab is used for producing large trees. Apple culture, as yet, on the continent, is in its infancy compared with that of England. Many valuable sorts introduced from America and the Crimea are far better known here, owing to their culture in pots under glass.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

Apple trees abroad are trained much as pears are, the shoots, however, generally more closely stopped than ours, which is an advantage. The most remarkable apple tree cordon is the horizontal or lateral, "cordons unilatéraux," as the French term them. This cordon, figure 1 (at the base), is that about which so much has lately been written in the "Times" and the leading horticultural journals, and is still much discussed. As it is really *most useful* for edgings for fruit borders, and very suitable for amateurs and others with small means, an authentic account from French sources is here given.

Apple cor-
dons.

Horizontal
cordon.
Figure 1.

The trees destined to form an horizontal cordon should be grafted on the French Paradise stock, if the soil be of substantial quality, and do not slope, as such a slope is apt to cause the roots to become denuded from their proximity to the surface. If the soil be not so rich, either the French Doucin or English Paradise stocks are recommended. Wires are placed at 15 inches above the earth, strained through stout posts. On these, maiden trees are bent down, planted at five feet intervals, if on the feebler stock, and at seven if on the stronger. The extremities of the young trees are left free all the summer, and as soon as they are past the tree nearest to them they are grafted into it. Three years is considered the period required to effect this junction with trees on dwarfing stocks. These last are preferable, as they produce finer fruits.

The simplicity and economy of this style cannot be too highly praised. Diagonal cordons for pears and horizontal cordons for apples are *valuable hints* given by this exhibition, though, of course, in use previously. They will soon become popular in this country. Of course the shoots must be pruned back in pure cordon style, *i.e.*, very closely summer-stopped to three or four inches, according to variety.

Peaches are most commonly worked on the almond stock

Peach cul-
ture.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

in France. Much of the cultivation in the south is inferior, being in the form of standards of poor varieties, on this stock.

It requires a deep soil, and free from excessive moisture which soon destroys it. The free stock is excellent, less vigorous than the almond, but requires also a substantial and dry soil. The plum (Damask and St. Julian varieties) endures moisture better, and is a favourite. The black thorn is rarely employed, and only for very indifferent soils.

Montreuil
culture.

"The cradle of good French peach culture," says Gressent, "is at Montreuil." That is, Montreuil is considered abroad as the best type of ancient modes of training and pruning on the long system, now being superseded by the close system. Montreuil, it is well known, still mainly supplies the Paris markets for peaches from early in August. Before this date the supply comes from Algiers. The peaches of southern France are not good enough to compete with these sources. The climate and soil of Montreuil are unrivalled for this culture, and the names of Lèpere and Malot well known. The walls being generally lower than with us, cause the trees to be trained with a large lateral development. The "old Montreuil fan" and the famous "Espalier carré" are the *very best* forms of this kind on the Continent. No pure specimen of either was exhibited, which is somewhat strange.

The shoots in this style of tree are extremely regularly trained in. They are excellent specimens of long pruning. Many must have judged of their merits, as seen in other Montreuil forms exhibited (as was previously stated) by Chevalier Ainé, who obtained the first prize, and also by Gillechens, of Belgium, second prize. The regular beauty and symmetry of these shapes cannot be excelled. English gardeners as a rule prefer the irregular fan (not without certain merits of its own), though Seymour's style is very regular and beautiful.

Chartres
culture.

But the *most remarkable feature* in modern French culture of the peach is the new system advocated by M. Grin, of Chartres. No pure specimen was shown for some reason or other, which is much to be regretted; the English visitor must, therefore, seek them at Chartres, to judge fairly of their value, in the inventor's own gardens. This peculiar system is the very closest of all close pruning, and has as many warm adherents abroad as strenuous opponents. It is making great progress, however. Intermediate systems of peach culture, much resembling the mixed system so long ago brought forward by our celebrated horticulturist Knight, exist, which cannot be noticed here. Suffice it to say the Montreuil and the Chartres cultures are *diametrically opposed to each other*, and each types of the *best* of their

respective theories. The visitor, therefore, need seek no other spots than these two.

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

The palmette verrier, which resembles Figure 2 in every respect except the double central leaders (which is a *great advance*) would be considered one of the best types of good French and Belgian wall culture for peaches. Figures 5 and 6, having also the double central leaders, are excellent forms for good and systematical peach culture; much of it however, is extremely bad abroad.

Peach cordons.

Figures 2, 5, and 6.

In the northern districts, of course, the culture has much the same difficulties to contend with as we have, but even there protecting screens are not yet in favour. In short, good peach culture is confined to districts on the Continent, and very much is inferior.

Peach cordons of the diagonal form are used, but are not very common. This style is not quite large enough for such a kind as the peach, and is not therefore recommendable for our own climate. But for the back walls of lean-to orchard-houses (as first used by the present writer) nothing equals it. Various forms were exhibited, but would be thought too fantastic here; only, therefore, such as are *really practical* have been dwelt on. For example, a waved single cordon would not be relished in this country, forgetting that it is to be seen in the works of our best ancient writers.

Strictly confining ourselves to our subject, fruit-trees and Vines. their culture on the continent, vineyards would not form a useful item of this report. We can never hope to cultivate the vine profitably on the open wall, and the increased use of glazed structures renders this daily more useless to attempt. With such accessories as ground vineries, no one need seek beyond. Walls of cottage gardens can be more profitably occupied, nor is the famous system of the vine "à la Thomery," as was exhibited by M. Charmeux, the Mayor of Thomery, likely to be adopted here, though the best for open air culture. The grape most cultivated is still the famous Chasselas de Fontainebleau, our royal Muscadine.

Grape culture under glass either in Holland or France presents *no feature* by which English growers could hope to profit. Grapes so raised are always of second rate quality, as Covent Garden testifies. So many proofs have been given of the very *decided superiority* of English grape growing over any Continental results that no question exists on this head. Even the prize taken at the last Exhibition was by Mr. Knight, an Englishman settled in France. The vineyard culture, on the other hand, is a distinct branch hardly

REV. T. C.
BRÉHAUT
ON FRUIT
TREES.

entering into our subject, very interesting, and in which the French excel. Many of the vines exhibited were of very old stocks extremely well pruned, and vigorous. Some arched vines about three feet in height might give hints for low vineries, being remarkably prolific.

Use of glass.

Continental are slow to profit by the use of glass. By the adoption of orchard-houses in England, in such places as the Channel Islands, the most beautiful tropical peaches and nectarines can be well matured, and as early as at Algiers. Varieties unknown abroad are becoming common here, and appreciated.

By means of glazed structure erected cheaply fine oranges, such as those exhibited from the Grecian islands, might be ripened in northern latitudes. Late grapes might be thus grown to supply half of Europe at Christmas. Orchard-houses in mid-France would ripen peaches early in June, and be very remunerative. All over the continent glazed structures would create a totally new class of fruit culture, and reverse many an antiquated notion; but this will take long to do, our neighbours are too deeply prejudiced, and too long accustomed to depend on their magnificent soils and climate. The exchange of ideas promoted by international exhibitions may, however, effect something.

Horticultural implements.

The horticultural implements exhibited a certain advance towards English models, chiefly in Russia. The main difference between English and foreign pruning knives appeared to be that the necessary curve was applied abroad to the blade, and with us, to the handle. Excellent pruners were shown by the Brothers Sella, of Piedmont, cheap and well finished. The Prussian forms were very good indeed, and far superior to the Austrian. Turkey showed some elementary shapes. For pruning scissors continentals universally prefer their own *secateur*, which English pruners object to as fatiguing the hand. Saynor was the only English exhibitor of note in this section, and showed some splendid specimens. The same with respect to other implements used in fruit culture, wherein English workmen greatly excel. There is one feature however, in continental work of this kind, and it is its cheapness.

REPORT on SEEDS and SAPLINGS of FOREST TREES.—
(Class 87.)—By Dr. HOOKER.

DR.
HOOKER
ON
FORESTRY.

FORESTRY, a subject so utterly neglected in this country that we are forced to send *all* candidates for forest appointments in India to France or Germany for instruction, both in theory and practice; holds on the continent an honourable, and even a distinguished place amongst the branches of a liberal education: In the estimation of an average Briton, forests are of infinitely less importance than the game they shelter, and it is not long since the wanton destruction of a fine young tree was considered a venial offence compared with the snaring of a pheasant or rabbit. Wherever the English rule extends, with the single exception of India, the same apathy, or at least inaction, prevails. In South Africa, according to the colonial botanist's Reports, millions of acres have been made desert, and more are being made desert annually, through the destruction of the indigenous forests; in Demarara the useful timber trees have all been removed from accessible regions, and no care or thought given to planting others; from Trinidad we have the same story; in New Zealand there is not now a good Kandi Pine to be found near the coast, and I believe that the annals of almost every English colony would repeat the tale of wilful wanton waste and improvidence.

Forestry
neglected in
countries
under
English rule.

On the other hand, in France, Prussia, Switzerland, Austria, and Russia, the forests and waste lands are the subjects of devoted attention on the part of the Government, and colleges provided with a complete staff of accomplished professors train youths of good birth and education to the duties of state foresters. Nor, in the case of France, is this law confined to the mother country; the Algerian forests are worked with scrupulous solicitude, and the collections of vegetable produce from the French colonies of New Caledonia, &c. contain specimens which, though not falling technically under Class 87, abound in evidence of their forest products being all diligently explored.

Forestry on
the Conti-
nent.

The collection exhibited by the Administration of Forests of France is by far the the finest of its kind ever brought together; the enumeration of its contents alone fills an instructive pamphlet of 160 octavo pages, classified as follows, and which further contains a great deal of useful

France.

DR.
HOOKER
ON
FORESTRY.

information on the geology of the forest regions, the growth, strength, and durability of timber, and many other matters concerning which no certain information is obtainable in this country. It consists of—

1. Forest map of France, showing the relations between the distribution of the forests and the geology of the country.

2. A collection, in the shape of books, of the indigenous and naturalized woods. Each species is represented by several specimens, differing in their origin and qualities. The specimens, of which there are 1,300, are divided into two classes; namely, woods of ordinary leaf-bearing trees, and of conifers; these in each class are arranged alphabetically.

3. Collection of truncheons of the most important indigenous species. 223 specimens.

4. Experiments and observations on the density of woods, particularly with regard to age. Specimens exemplifying the opinions given.

5. Collection of seeds and fruits of indigenous and naturalized species.

6. *Corks*.—Complete collection of corks of all ages and qualities, and of French production, furnished by the cork oak (*Quercus suber*) and the western oak (*Quercus occidentalis*).

7. *Barks* and astringent substances suitable for tanning or dyeing.

8. *Resins* from the *Pinus maritima* and *Pinus Laricio*; methods of procuring them, and their various products.

9. *Charcoals*.

10. Different products resulting from the carbonization of wood.

11. Forest sawmills: three models.

12. Instruments for felling, pruning, &c. trees, and for collecting resin. A pusher for directing the fall of trees felled by uprooting. The "Flamm" saw. Rollers for the removal of logs from young plantations without injury to the latter.

13. Relievo of the valleys of Barr and Andlau (Lower Rhine), to show the arrangement of the forest roads established there. Sledge tracks with sledges, tramway with waggons, metalled roads.

14. *Replanting*.—Relievo of the perimeter of the plantations of Labouret, above Digne (Basses Alpes). Photographs of mountains to be laid down with grass or replanted.

15. Photographic forest herbarium, consisting of photographs of the branches with leaves, fruit, and flowers of the various forest trees, all of the natural size.

It only remains to add that the specimens are well selected

and excellent, the method of ticketing leaves very little to be desired, and the arrangement is admirable.

With regard to the other collections, chiefly appertaining to Class 87, the reporter has little to say; there was no English exhibitor, and up to the end of April, when the jurors were called together for the purpose of deciding upon the merits of the exhibitors, there were no collections of any importance ready for adjudication.

Further, various circumstances occurred that rendered it impossible to consider certain collections of plants, some of whose contents might be considered as referable to Class 87 from other cognate classes, and it hence became necessary to amalgamate the duties of Class 87 with those of other classes, including that class under which hardy conifers more naturally came, as objects of landscape gardening or ornamental planting, and not of forestry proper. Under this head comes the beautiful collection of hardy conifers of Messrs. Veitch and Sons, to which the first prize was awarded, with the full complement of marks; and the same firm carried off the first prize for a collection of the rarest Coniferæ not yet in commerce. Plants.

The collection at Billancourt, which did not exist in April, was visited by Dr. Moore, F.L.S., associate juror, in August, and he found many very interesting plants suited for forest purposes amongst them, but they were not exhibited under Class 87, and I shall therefore allude to them here in reference to their being probably, at some future period, introduced into plantations in such considerable quantities as to be profitable as timber trees. Billancourt.

M. Accidin, aîné, nurseryman, Lisseux, was awarded the first prize for a collection of forest conifers, which consisted of the kinds usually selected for the same purpose in England, along with many rare species which are not yet sufficiently abundant for forest planting, though they may yet become suitable for that purpose when the prices at which they now sell are lowered at least 90 per cent. *Pinus grandis*, *Pinus nobilis*, *Pinus Nordmanniana*, *Pinus Benthamiana*, *Pinus Coulteri*, &c., all of which were in this collection, are not likely to be either moderate in price or plentiful for many years to come. There were equally rare *Thujas* and *Cupressus* in this collection, as well as other scarce coniferæ, which obviously cannot be considered under Class 87. French exhibitors of forest trees, &c.

M. Accidin had also a large collection of trees generally used in forest planting, such as oaks, *Juglans*, willows, &c. Among the oaks, *Quercus castanæfolia*, *ambigua*, *aquatica*, *haliphlaeos* were fine foliaged kinds.

DR.
HOOKER
ON
FORESTRY.

M. Rissot, Inspector of the Forests of the Bois de Boulogne, exhibited a good collection of conifers, more suitable in general for forest planting; among which were some Mexican species of *Pinus*, which seemed hardy looking kinds. The same exhibitor had also a good general collection of forest trees.

M.M. Crox and Sons, nurserymen, at Sceaux, Seine, exhibited good collections, similar to those of M. Accidin.

M. L. Paullet, Chatmay les Sceaux, près Paris, exhibited a large number of conifers, including *Wellingtonias* and *Araucarias*, among the forest group.

M. Troyes, horticulturist, Tours, had also a collection of a more general kind. Among the plants in this group were *Symphoracarpus mexicana*, a fine looking plant, if sufficiently hardy.

Pruning.

A series of plants were also exhibited for the purpose of showing the effects of pruning by different methods, preparatory to planting in forests and in towns, as well as for ordinary ornamental purposes. This was not a successful exhibition, as many, in fact nearly all, the trees which had been brought for the purpose were dead, owing to their having been removed at a late period of the year.



LONDON:

Printed by GEORGE E. EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.

DR.
HOOKER
ON
FORESTRY.

M. Rissot, Inspector of the Forests of the Bois de Boulogne, exhibited a good collection of conifers, more suitable in general for forest planting; among which were some Mexican species of *Pinus*, which seemed hardy looking kinds. The same exhibitor had also a good general collection of forest trees.

M.M. Crox and Sons, nurserymen, at Sceaux, Seine, exhibited good collections, similar to those of M. Accidin.

M. L. Paullet, Chatmay les Sceaux, près Paris, exhibited a large number of conifers, including *Wellingtonias* and *Araucarias*, among the forest group.

M. Troyes, horticulturist, Tours, had also a collection of a more general kind. Among the plants in this group were *Symphoracarpus mexicana*, a fine looking plant, if sufficiently hardy.

Pruning.

A series of plants were also exhibited for the purpose of showing the effects of pruning by different methods, preparatory to planting in forests and in towns, as well as for ordinary ornamental purposes. This was not a successful exhibition, as many, in fact nearly all, the trees which had been brought for the purpose were dead, owing to their having been removed at a late period of the year.



LONDON:

Printed by GEORGE E. EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.

Reports on the Paris Universal Exhibition, 1867 Presented to both Houses
of Parliament by command of Her Majesty

Bd.: 5

London 1868

Techn. 1339 i-5/7

urn:nbn:de:bvb:12-bsb10306311-0